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Foot Bridge across Broadway.

Not only the inhabitants of the metropolis but the people of the country—the thousands of strangers who daily crowd our streets—will rejoice at any attempt to relieve the jam which appears to be now the normal condition of some of our streets, especially Broadway. It is no uncommon thing that pedestrians, desiring to cross Broadway in the vicinity of Fulton street, are compelled to go down below Trinity Church before they can get an opportunity to do so. The corps of policemen, always ready to assist the young, old, and the weaker sex, are insufficient to reduce the annoyance to a minimum.

We present, herewith, a fine engraving of the proposed bridge across Broadway, from Fulton street east, to Fulton street west. The view is taken from the corner of Fulton, at St. Paul's Church, looking down Broadway. The artist has introduced a large number of figures to suggest the crowded state of the street, but the engraving does not do justice to the vehicular and pedestrian crowd which, day after day from early morning to night fall, surge and push through the main thoroughfare.

The bridge is of iron—wrought and cast—elevated 17 feet 8 inches over Broadway. The length of the bridge is 57 feet at Knox's corner, and 54 feet at the other; the width is 14 feet. The bridge has two longitudinal beams, a combination of wrought and cast iron, one a flange and the other a lattice, each calculated for 46 tuns breaking weight; but on trial the bridge is found capable of sustaining 101 tuns, one-third of which is the permanent weight of the bridge. As set up in the yard, 100 men passed over it at one time producing no perceptible vibration. Loaded with 50 tuns, the depression was less than three-eighths of an inch. The bridge is reached by four flights of steps, each 19 feet high, five feet wide, having to each flight three landings, the steps of each numbering 34. Both the lattice work of the stairways and of the bridge proper are lined with sheet iron to a hight of three feet; the intersections of the lattices being ornamented with rosettes. Four iron columns 14 inches diameter, with broad bases, sustain the bridge, and shorter columns the stairways. These higher columns will be used as lamp posts. The bridge will be permanently secured at one end and the other will rest on rollers to provide for contraction and expansion. The steps of the stairs will be of oak, as well as the deck of the bridge, which will be calked to make it water tight.

Ritch & Griffiths, Architects, 153 Broadway, are the designers and contractors. The contract price was $15,000, but the builders state the actual cost at $22,000. When located, which is expected by the 1st of March, it will be an ornament to the street as well as a convenience to the people

The work of laying the foundations of the end columns is already in progress, a corps of laborers being employed at the corners. The bridge will accommodate those who desire to cross Fulton street on either side of Broadway, as well as those who would cross Broadway itself.

Our reporter feels indebted to Mr. J. M. Duclos for facilities afforded him in procuring the facts in relation to the structure and dimensions of the work.

THE BROADWAY BRIDGE FOR PEDESTRIANS.

Chilled Shot.

Messrs. Hick, Hargreaves & Co. are now making shot and shell of Bessemer steel for rifled cannon of 9-inch bore. The shot are solid cylindrical flat-fronted projectiles, and are slightly tapered at the fore end. They are 14 inches long, and are fitted at the back with a disc of soft brass, (containing a preponderence of copper), which is intended for filling the rifling of the gun by expansion. The brass disc has at its back a projecting rim of about three-sixteenths of an inch thickness, and an equal depth, which forms an expanding cap, the sides of this cap being driven out laterally and forced into the grooves of the gun by the explosion of the powder. The pressure of the gases in the chamber of the gun is also made use of to secure the disc to the shot. The base of the latter is provided with 12 radial grooves, the segments between these forming incline planes. The brass is forced into these grooves by the explosion, and is firmly combined with the shot itself. The shells are of similar shape to the shot, but are but are bored out of solid Bessemer steel cylinders, and fitted with cast-iron hemispherical fronts. The workmanship of these projectiles is very fine; and each of them is carefully packed in a separate wooden case for transport. Their destination is unknown. A considerable number of chills for casting Palliser shot are also in course of manufacture at the above works, to the orders of the British Government. They are made of soft gray cast-iron and have a pair of trunnions cast on them, so that they have the appearance of small mortars. The trunnions are carefully turned, and then made use of for fixing the chill to the face-plate of the lathe in temporary bearings for boring. The pointed bottom of the bore, corresponding to the nose of the Palliser shot, is finished with a tool carefully ground to a template from a flat piece of steel, this tool being inserted in the front of the boring bar, and held fast in its position by a pair of screws. Great numbers of such chills are in request, as they are rapidly destroyed in the casting of chilled shot. There is no doubt but that these carefully-finished chills must considerably enhance the prime cost of chilled shot.

SOMETHING ABOUT CLOCKS.

Clocks may be considered a modern invention. Even within a few years great improvements have been made in their manufacture by which they may be ranked among the commonest articles of household convenience because of their cheapness, while at the same time their value as accurate timepieces is not impaired. This result is due to the employment of machinery instead of hand labor in their construction, by which rapidity, exactness, and the reduplication of parts is secured.

The first time-measurers of which we have any historical knowledge were sun-dials, similar probably to those now used merely as curiosities. But before that period, time was undoubtedly measured by the observation of natural objects, particularly the relative length of shadows cast by fixed objects. In the book of Job, one of the oldest of preserved writings, he refers to this mode of measuring time when he says, chap. vii, 2–4:—

As a servant earnestly desireth the shadow and as an hireling looketh for the reward of his work, so am I made to possess months of vanity and wearisome nights are appointed to me. When I lie down I say, When shall I arise and the night be gone. And I am full of tossings to and fro unto the dawning of the day.

This custom has obtained even to our own days. Many now living remember how, in the country, where no more re-

liable means were at hand, the dinner hour and the time for ceasing labor on the farm were determined by the length of shadows cast by familiar objects. The sun-dial, however, in some shape, has been used for many centuries. We remember when in the school room we watched lines on the window sill, scratched with a pocket knife, to cheer the tedium of the "hope deferred" by anticipating the welcome hour of dismissal, or the time of recess.

An improvement on the sun-dial was the clepsydra, a vessel containing water which found its way, drop by drop, through a minute aperture. These water clocks appear to have been of very early invention. They were used by the Chaldeans, and introduced into Europe by the Romans. The hour-glass was a great improvement, and was used within the memory of persons now living, as measurers of time, especially in the school room, and these cannot forget the couplet in the "New England Primer"—

"As runs the Glass,
Our Life doth pass."

Sand glasses registering three or four minutes are now used as attachments to egg-boilers, and also at sea for some nautical calculations.

We have no certain data for fixing the invention of clocks which were in any degree similar to those now used. Indeed, the only characteristics of these early time-measurers which they have in common with ours, is that they had wheels, one or more pointers, or a bell, and were moved by weights. Such or a similar machine is spoken of as being sent to Frederic II., by the Sultan of Egypt. Calmet in speaking of the customs of the Cistercian monks in 1120, alludes to the striking of the clock to awaken them to attend to their devotions. Dante, who died in 1321, speaks of the striking of a clock. About 1364 Henri de Wyck, a German mechanician, erected a clock in the palace of Charles V., of France. Most of the historical evidence which is reliable seems to point to this period as the first introduction of clocks, and to the fact that the Germans were the most successful clock makers.

The discovery of the isochronism of the pendulum by Galileo and its application to the regulation of clock work by his son, Vincenti, appears to have been the starting point from which the art of horology has reached its present state of perfection. Christian Huygens, however, seems to deserve credit for constructing pendulum clocks, which were really valuable and reliable, although Richard Harris, of London, claims to have antedated the improvements of Huygens by sixteen years, he having used the pendulum successfully in 1641, while Huygens claims are dated 1657.

To come nearer to our own times, who has not seen the Dutch clocks generally brought to to this country by English and German emigrants? They had no cases, only a dial, behind which were the works, the whole being suspended from a nail on the wall near the ceiling. The weights hung by strings, and could descend to the floor, while the clock was wound up by pulling a cord. Still later we have the long-cased clock, so beautifully characterized by Longfellow in his poem, "The Old Clock on the Stairs."

Somewhat back from the village street
Stands the old-fashioned country seat;
Across its antique portico
Tall poplar trees their shadows throw,
While from its station in the hall
The ancient timepiece says to all;
Forever——Never——
Never——Forever.

Halfway up the stairs it stands,
And points and beckons with its hands
From its case of massive oak,
Like a monk, who, under his cloak,
Crosses himself, and sighs, alas!
With sorrowful voice to all who pass,—
Forever——Never——
Never——Forever.

These old clocks had pendulums beating whole seconds and running eight days, both of which were provided for by the length of the case, which extended from the floor to the ceiling, at least in low ceiled houses, being six or seven feet high. The story of the suitor who hid in the clock case from the prying investigation of the irate father is familiar to all. Many of these old-fashioned clocks showed, in a semi-circle above the face, the changes of the moon, and all were ornamented with quaint pictures on glass. To many of our readers this brief reference to the old-fashioned clock will bring a recollection of pleasant seasons and scenes not to be again enjoyed or viewed.

The last phase of clock making is the introduction of the Yankee clocks, convenient, cheap, portable, excellent time-keepers, and models for workmanship without unnecessary finish. We have seen good clocks sold at retail for seventy-five cents, and even now they can be bought for a dollar or two, while the old-fashioned, long clock was considered a splendid article of furniture and a handsome dower for a bride. These cheaply acquired clocks, however, have not the life-long influence of the more costly ones of preceding generations. Then a clock was one of the household Penates, not to be parted with, but as precious as were her household gods to Rachel when she hid them under her camel's saddle. But the Yankee clocks have not only furnished every house in our land, but from their cheapness have found their way into the cottages of English laborers and the dwellings of the original clockmakers, the Germans.

A NEW METHOD OF SAPONIFICATION.

[For the Scientific American.]

Mège Mouriès, a distinguished French chemist, has recently found that the neutral fats in the oil seeds during germination, as well as in the animal organism during life, take the state of very movable globules, which offer to the action of reagents a great surface. In this globular state fats show very peculiar properties, from which we will only mention those calculated to interest the readers of this journal.

1. In the ordinary state, fat, as for instance, tallow, soon becomes rancid upon exposure to the air: in the globular state and in a milky form, however; or in the dry state, in the form of a white powder, it will remain for a length of time without alteration. For all practical purposes this is easily obtained by mixing melted tallow of 113° Fah., with water of the same temperature, holding in solution 5 to 10 per cent of soap.

2. In the ordinary state it is difficult to combine tallow as well as other fatty bodies with hot salty caustic lyes, but in the globular state they absorb this lye immediately in a proportion varying with the temperature. Each globule, as it is attacked from all sides by the alkali, gives in such a case its glycerin quickly off and in such a degree that in a very short time each globule is transformed into a globule of perfect soap filled with lye. Two to three hours are sufficient for obtaining such a result.

3. These saponified fat globules have the property, when heated over 140° Fah., of running off the surplus lye with which they are swelled or filled, and of retaining only water for ordinary soap. They thus eventually become transparent (semi-liquid) and by stirring, form a layer of melted soap over the lye, containing the glycerin.

4. The saponification of this mass is so complete, that for the preparation of stearic acid it is only necessary to add a corresponding quantity of diluted sulphuric acid, whereupon sulphate of soda will be formed and the fatty acids separated.

It is then only necessary to melt them by the application of steam for the purpose of separating them from the solution of sulphate of soda, to let them crystallize, and to press them cold. Stearic acid will be obtained, unchanged, inodorous, and with a melting point of 136° to 138° Fah., while the oleic acid, flowing off, will be nearly colorless.

The latter is even of a better quality than fat oils, and more desirable and useful for the manufacture of white soaps of first quality either alone or with other fatty substances. By using oleic acid alone (the glycerin being separated) it is only required to neutralize the same with weak lye: the formation of soap then takes place immediately, which can be melted at once. If, however, the oleic acid be mixed with ordinary fats, the process described under (1) must be followed. Saponification can be effected in 6 hours and in the course of 24 hours a soap can be prepared as neutral and good and of the same detersive qualities as the best old olive-oil soap found in commerce. By this method not only is more time saved but no fat is lost in saponification, whereas in the ordinary process no small quantity of fat is wasted by running in the under lye.

Mège Mouriès manufactures at present in his factory near Paris 3,000 pounds of fatty acids daily, separating the whole amount of the stearic acid existing in the fats and using at the same time the oleic acid obtained thereby for the manufacture of soap. A. O.

THE COTTON MANUFACTURE—RING SPINNING AND DRESSING.

The yarn spun upon the mule is usually intended for the "filling" that portion which carries the threads across the width of the cloth, and is generally softer spun than that for the "warp" or length-wise threads. This warp yarn is spun on the throstle or the ring spinner. The throstle is not materially different in its operation from the fly frame which twists the roving although much simpler in its construction. Like the fly frame it spins and winds the yarn upon spools by means of fliers. The ring spinner is a more modern machine, and it winds the yarn upon a cone-shaped bobbin which, when filled, resembles the cop formed by the mule. This yarn is frequently used, as that of the cop, for filling, as the bobbin containing it is adapted for being carried in the shuttle. The ring spinner is a machine of peculiar construction. The spindles carrying the spools are arranged on the sides of the frame vertically and driven at a high speed. They project through openings in a horizontal bar, each aperture considerably larger than the diameter of the full spool. These apertures have a projecting rim standing above the general surface of the bar, which rim is flanged on the upper edge making a projecting lip. A little coil of thin steel made from strips resembling in size the mainspring of a watch, is slipped or sprung over the lip of the ring and slides around its circumference. This coil or loop of steel is called a "traveler." It is simply a ring of thin steel perhaps one-eighth of an inch wide, the diameter of the ring less than one-fourth of an inch. Being of a fine spring temper the two ends of the ring can be spread and sprung over the lip of the ring in the horizontal bar, the elasticity causing the ends to grasp the ring to prevent flying off.

The object of these "travelers" is to guide the thread on to the spool. As the spindles revolve the thread, passing through the "traveler," carries it around with great velocity, and the horizontal bar traversing vertically back and forth, winds the yarn upon the spools in regular concentric layers. In all these spinning machines the roving is led between rollers, the under ones being of fluted steel and the upper of iron covered with smooth leather and weighted.

It remains now to convert this yarn, both warp and filling, into cloth unless the intention is the production of thread. If this is the object, doubling and twisting, starching and glazing and other processes for preparing it for the market, follow the process of spinning; but our object is to follow the yarn through the most important after processes to convert it into cloth. In some establishments the hard twisted yarn or warp is re-wound on larger spools for "warping." This process is simply winding the yarn on a "beam" or immense spool, the length of which corresponds with the width of the cloth to be woven. Hugo "creels" or frames hold the bobbins of yarn, and through suitable guides the yarn is wound upon the beams. The beam, being filled, is taken to a machine called a "dresser." A number of beams are placed in suitable bearings at each end of the machine, and the yarn is led toward the center where it is again re-wound upon other beams. But during its passage of twelve or fifteen feet it has undergone quite a change.

All yarn when first spun is "fuzzy" or bearded, full of fibers sticking out from its surface in all directions. These fibers on the warp yarn would considerably interfere with the weaving, and as they cannot be so readily removed and their removal would impair the "body" of the cloth, they are glued down; or, rather, the yarn is sized or starched. This is done on the dresser. The yarn as unwound from the beam passes through a trough of starch, and as it leaves the trough the superincumbent starch is scraped off by the yarn passing through minute perforations in sheets of copper, while immense brushes traverse back and forth on the web cleaning and smoothing the yarn and brushing off the loosely adhering particles of starch. The yarn is thoroughly dried by suitable heaters, the pipes of which pass close to the web, and by blowers keeping up a constant blast of air. Consequently the yarn is dried very rapidly, and when re-wound on the beam is ready to be placed in the loom. The room where this dressing is done is, of course, kept very hot, but we never heard that the occupation is unhealthy.

In the next and final article we will notice the operation of weaving and the subsequent manipulations to prepare the cloth for the market.

TRADE MARKS—GILLOTT'S 303.

Our reference to the law of trade marks in an article on the general subject last week, received a happy illustration before it was fairly published, in a decision at the General Term of the (New York) Supreme Court, in the case of Joseph Gillott against Richard Eas.erbrook and others. "Gillott's 303" has been for many years a household word in this country, expressing an exact description and quality of pen, which was bought and sold by name alone, needing no examination, only an assurance of its genuineness. It is clear that the use of this number had become lucrative, and might be made so by any one who should adopt it, and that its value in either case results from the long sustained and high character of Joseph Gillott's manufacture alone. If any result of labor and skill can be property, the reputation and significance which the number "303" as applied to pens had acquired, was the property of Joseph Gillott. The trespasser in the above case was not charged with forging the name of the rival manufacturer, but with appropriating the mark which he had made valuable, and offering to the public another "303", virtually represented as different only in the manufacturer's name, and thus profiting by the public confidence in that brand, which Gillott's manufacture had inspired. In the absence of a patent, the right arises with the inducement to infringe it, from the value acquired by long and meritorious use—not from the mere prior adoption of a number. The case has been vigorously contested by the defendants from court to court with the aid of very eminent counsel, and although the decision above referred to and preceding ones were all against them, they may yet perhaps carry the question still higher until it shall be settled beyond appeal or debate.

A NEAR VIEW OF THE FUTURE.—A sleepy traveller dreamed the other day of riding across the continent by rail, and heard among other sounds the voice of the brakeman at intervals sent through the half-opened door in words like these:

"Chicago. Change cars for New Orleans." "Missouri River. Change cars for Saskatchawan, Leavenworth and Galveston." "Rocky mountains. Change cars for Santa Fe, El Paso, Matamoras and the City of Mexico." "Salt Lake—twenty minutes for dinner. Change cars for Fort Benton, British Columbia, Fah Renegat, Panama, Lima and Valparaiso." "Virginia, Nevada. Change cars for Owyee, Columbia River, Puget Sound and Kamschatka." "San Francisco. Passengers for New Zealand, Honolulu, Melbourne, Hong Kong, and all points of Europe, Asia and Africa, will keep their seats till landed on the wharf of the daily line of the Pacific Mail Steamship Company. Baggage checked through to Pekin, Calcutta, Grand Cairo, Constantinople, St. Petersburg, Paris and Liverpool."

WET YEAR.—There was more rain in 1866 than in any previous year since 1831, and 12·29 inches more than the average of that period, while the evaporation was 3·77 inches less.

NEW PUBLICATIONS.

CATALOGUE OF CASTS OF FOSSILS from the Principal Museums of Europe and America; with short descriptions and illustrations. By Henry A. Ward, A.M., F.G.S., Professor of the Natural Sciences in the University of Rochester. Rochester: Barton & Andrews, 1866. 8vo. pp. 228.

We value highly this addition to our scientific library of reference. The general reader also will find it "stranger than fiction," and, as it is a little book, a cheap and ready means of becoming acquainted with the old fossil world, so far as it is yet known to man. The author has obtained these casts by the slow labor of years, and copies are now offered for sale.

AN ELEMENTARY MANUAL OF QUALITATIVE CHEMICAL ANALYSIS. By Maurice Perkins, Nott Professor of Analytical Chemistry in Union College. New York: John Wiley and Son, 1867. Small 8vo. pp. 65.

This little manual consists of a selection of three or four of the most characteristic reactions, with a system of analysis for each of the more commonly occurring metals, acids, and radicals on the plan pursued in the laboratory for the instruction of the Engineering Department of Union College.

GARDENING FOR PROFIT: A Guide to the Successful Cultivation of the Market and Family Garden. By Peter Henderson. New York: Orange Judd & Co. 12mo, pp. 250.

This treatise is by an experienced Market Gardener, and is a practical, business-like manual of advice: just such a talk as we should wish to have before engaging in gardening, from an intelligent man who had followed the business as a business all his life.

AMERICAN HORTICULTURAL ANNUAL, 1867. A Year Book of Horticultural Progress, for the Professional and Amateur Gardener, Fruit Grower, and Florist. New York: Orange Judd & Co., 12mo, pp. 150.

This beautiful Year Book and Almanac will do well to accompany the above noticed volume.

Editorial Summary.

ITALIAN PETROLEUM.—This valuable mineral product is abundant in Italy, and remarkably pure. The city of Genoa was long lighted with crude mineral oil. In the provinces of Modena and Parma, it issues from the mud volcanoes, or from parts adjacent. A Mr. Fairman, of Pisa, has obtained from the Government the exclusive right of search in the rich oil districts of Reggio and Modena, besides an increased duty on the importation. He is now offering privileges on liberal terms to English capitalists. The U. S. consul at Ancona (Mr. Charles Ribighini), has lately placed upon the English market a very fine oil found in Southern Italy, which he calls from the place of its nativity "Toccolina." It is described as perfectly limpid, of a bright yellow, without smell, and of a gravity of 80° to 85°.

FRENCH COMMERCE.—The returns for 1866 show that France like our own country is at a standstill in shipping, while carrying on a great commerce in foreign bottoms. We learn from a cotemporary that the entering tunnage was 5,117,460, against 4,572,857 in 1865, and 4,312,668 in 1864; and the outward, 3,625,012 in 1866, against 3,249,070 in 1865 and 2,968,720 in 1864. The question is, what became of the tunnage that went in but did not come out? Nothing extra hazardous, we hope, in entering French ports. Apparently two distinct classes of tunnage are referred to without discrimination, or else tuns of freight are meant, instead of tunnage of shipping.

THE PARK HEAD FORGE (Scotland) is among the heaviest workers of its kind. It has two 7-tun hammers, one 6-tun and eleven smaller hammers of one tun and upward. Among its heavy forgings have been the stern frame for H. M. ship *Achilles*, weighing forty tuns, and a double-throw crank shaft lately forged for one of Her Majesty's ships, weighing about thirty-two tuns. This was completed in six weeks and one day. For welding stern frames and other forgings of a similar construction, a hydraulic press is employed, and the weld is made in the furnace while exposed to the heat. There is a vertical drill in the establishment with a spindle 10 inches thick.

THE POPULATION OF EUROPEAN CITIES.—In 1866, censuses were taken in Great Britain and France, and the reports show the following population of the principal cities: London, 3,037,991; Paris, 1,825,274; Liverpool, 484,337; Glasgow, 432,265; Manchester, 358,855; Birmingham, 335,798; Lyons, 323,954; Dublin, 318,437; Marseilles, 300,131; Leeds, 228,187; Sheffield, 218,257; Bordeaux, 194,241; Edinburg, 175,128; Bristol, 163,680; Lille, 154,779; Toulouse, 126,936; Newcastle-on-Tyne, 122,277; Salford, 112,904; Nantes, 111,956; Hull, 105,233, and Rouen, 100,671. New York and Philadelphia have each a much greater population than any of these cities after London and Paris.

OXYGEN AGAIN.—M. Sessier de Mothsey offers as a simple and cheap apparatus for obtaining oxygen from the atmosphere, a tube containing a solution of permanganate of potash or soda and a jet of steam at a certain temperature. Heating the solution to the proper degree, a current of air speedily saturates it with oxygen, the nitrogen escaping; when the jet of steam is thrown in, displaces the oxygen and expels it from the solution. Being heavier than the atmosphere, the oxygen is collected in the tube nearly pure. The operation may be continued indefinitely. The apparatus will be exhibited on a large scale at the Paris Exposition.

NEW HAMPSHIRE GOLD MINING quite distances in excitement that of Vermont, apparently. A correspondent of the *Boston Journal* says that in Lisbon, four companies have been started, aggregate capital reported at $1,000,000. One stamp mill is running on surface ores yielding $6 50 per tun, promising great riches below. At and near Rumney, 25 miles south, over a thousand acres of land have been taken up, on the discovery of a lead which has been traced several miles, and from which gold, silver and lead have been smelted. In Lyman, adjoining Lisbon, large tracts of land have been secured for copper mining.

NOVELTY IN TANNING.—A tannery has been located at Rockford, Ill., in which is employed the patented process by exhausting the air from the vat. The tanning is said to be accomplished in twelve hours, and that of sheep skin in fifteen minutes. The weight of leather from a given weight of hides is ten per cent greater than by the ordinary process, and the cost of the works is but ten per cent that of the old. It is also claimed that the leather is better; but this point can only be determined by wear.

A VOLCANO IN THE MOON is said to be in active eruption. The crater called Linne has been lately observed to be obscured, and it is said that the same darkness was observed on this spot in 1788. The London Spectator says: "The impression is that an eruption is going on, but if so, must not the moon have an atmosphere? Could combustion take place without oxygen? Would the smoke—the carbonic acid gas—rise without some heavier gas, like atmospheric air, to rise in?"

NEUMEYER'S PROCESS for making inexplosive gunpowder, is as follows:—75 parts nitre, 6·25 sulphur and 18·75 charcoal, (the latter prepared from birch wood in a closed retort, soaked in soda lye and dried upon canvas strainers) are mixed in a moist state, and granulated in the ordinary way. English war powder consists of 75 parts nitre, 10 sulphur and 15 charcoal. Sporting powder, 77 nitre, 9 sulphur and 14 charcoal.

AMERICAN CIGARS AND "FINE CUT."—According to the records of the Internal Revenue Bureau, the number of cigars returned by manufacturers throughout the loyal section of the country, amounted to an aggregate of 1,281,359,355 on which tax was paid, between July 3d, 1862, and March 1st, 1866. The gross amount of tax paid on these cigars was $6,500,000. Of chewing tobacco, in the fiscal year of 1863, 15,231,174 pounds were returned, which yielded a tax of over two and one-quarter million of dollars; in 1864, 39,180,634 pounds, tax, $5,877,095; in 1865, 22,462,854 pounds, tax $5,936,101; and for the first nine months of the year 1866, 18,330,647 pounds, tax $7,329,428.

TOBACCO DE-VENOMIZED.—M. Melsens has found that tobaccos from various countries contain nicotine in very different proportions. In tobacco from some parts of France (*e. g.* the department of Lot) there is nearly eight or 7.96 per cent of nicotine, while Havana tobacco contains only two per cent. He proposes to smokers a way of preserving them from the effects of the alkaloid, and advises them to put into the tube of the pipe or cigar holder a little ball of cotton, impregnated with citric and tannic acids: as the smoke passes through the cotton it will deposit the nicotine therein in the shape of tannate and citrate.

PARAFFINE OILS will be injurious to brass bearings and journals if they contain sulphur or its compounds, as a result of the refining process. Dr. Vohl points out a way to detect these elements. He digested the oil for some hours at a gentle heat with a small piece of potassium, and adding water, tested the aqueous solution with nitro-prusside of sodium. The result was a deep purple solution showing the presence of a considerable amount of sulphur. Hydrofluoric acid as a bleaching agent, has been found by Dr. Vohl in the oil, and is very objectionable for lubrication, as it quickly attacks metals, and not less so for burning, as it forms a highly irritating vapor which causes inflammation of the eyes, destroys colors and acts on glass.

CHEAP RIDING.—It has been demonstrated in London, that men can be carried far more cheaply than they can carry themselves. The laboring man is conveyed to and from his home, distances varying from one to six miles, for one shilling per week, or less than two cents a trip. It is easy for him to see that his time and strength saved are worth more than this to him in wages at his work, and that many times this can also be saved to him in rent by fixing his residence out on the railway. Accordingly two of the most costly railways in England command by this policy a laboring men's traffic which is nearly if not quite the most profitable they enjoy.

PHOTOGRAPHY is applied in a very simple manner to register automatically the state of the thermometer or barometer at any regular intervals desired, throughout the day or even the twenty-four hours. An arrangement of clockwork is made to revolve the sensitive plate into position and uncover and close the camera tube at the proper intervals, thus obtaining a picture of the instrument. The movements of the compass, and the path of a ship, are also to be registered or rather pictured by photographic contrivances.

SOLUTION OF ROSINS FOR VARNISHES.—Calcutta copal and its congeners, as well as amber, are found, after heating in a closed vessel to 350° to 400° cent. (660° to 750° Fah.) to have acquired the property of dissolving when cool, in hydrocarbon or vegetable oils, without loss, and producing new and very fine varnishes. The combined influence of heat and pressure is the cause of the novel properties, the latter rising as high as twenty atmospheres.

A MONITOR.—At a recent meeting of the Institute of Civil Engineers, in England, Mr. John Bourne, celebrated engineer, read a paper upon the Navy, in which he demonstrated that the broadside system of iron-clads was a failure, and that the turret system—of which he expressly gave the credit to Capt. Ericsson as its inventor—must eventually be adopted by the English Admiralty, as combining the utmost possible concentration of offence and defence.

ABOUT 8,000 hogs, 2,000 sheep and 150 head of other cattle are now slaughtered weekly at the Communipaw abattoir. The yards will hold 20,000 hogs, 15,000 sheep and 6,000 head of cattle. A new and more merciful mode adopted for slaughtering beeves, is to insert the point of a sharp lance in the back of the neck, at the base of the brain. The death of the animal is said to be instantaneous, and is of course free from terror.

SAWING.—The foreman of Lawshe, White & Co., Osceola, Pa., furnishes us with the equipment of their mill, with which over 11,000,000 feet of lumber were cut in eight months, as follows: 1 slabbing gang; 1 flat gang; 1 muley saw; 1 double-edger. This mill, our informant says, having all the late improvements, can cut more lumber with the same number of saws than any mill within his knowledge.

PORCELAIN.—Since our article on glass, we have seen a report of recent experiments by M. Pelouze, in modifying the substance by varying the proportions of its constituents. Among other results, by increasing the proportion of silica to 400, he obtained a beautiful porcelain resembling the translucent marble called Algerian.

THE pride of position not unfrequently is the parent of injustice. Those mechanics who through perhaps compulsory experience, or by the favor of circumstances, have achieved a position which gives them responsibility and influence, are too often the most unreasonable in their exactions from the uninformed, or the inexperienced apprentice.

THE CLIMATE OF MICHIGAN is materially modified by the great lakes that surround it, softening and moistening the prevailing winds. In consequence, although in about 42 to 46 degrees north latitude, the belt of country bordering on the eastern shore of Lake Michigan for some miles back from the water, is becoming celebrated for the perfection of its fruits and the certainty of the crop. The state owes to the same cause the most extensive and valuable forests of timber now anywhere to be found east of the Rocky Mountains.

NEBRASKA produces twenty-five native varieties of the plum. In early spring, says a report to the Agricultural Bureau, hundreds of acres together of these indigeneous plums display one sheet of white flowers covering the landscape, and loading the air with fragrance. A certain variety has been observed which withstand the attacks of the curculio, and bear abundantly, while all others were thinned out by the insect. Three varieties of gooseberry are also native to this State, one of which is of remarkable size and flavor.

PATENT OFFICE DECISION.—It was omitted to be stated that the able decision, having reference to important improvements in sinking wells, from which an abstract of the points involved was given in last week's issue, was rendered by the Hon. Elisha Foote, S. H. Hodges and S. C. Fessenden concurring.

LONDON has a society for the saving of life from fire, by means of which 80 persons were rescued during the last year, from 610 fires. The force is 100 strong, with 85 escape stations.

"CANNEL."—The origin of this term is doubtful; but it seems to be the general opinion in the mining districts where cannel coal is obtained, that it is an easy corruption of "candle," referring to the free inflammability of the article.

CINNABAR.—Cinnabar of a beautiful vermillion color is found in an unusual form in Idaho, being abundantly spread throughout a gangue so massive, compact and homogeneous, that specimens may be cut and polished like marble.

A GREAT BELT lately manufactured by P. V. H. Van Riper of Paterson, for a cotton mill in Philadelphia, measures 103 feet in length, 38 inches in width, and three-fourths of an inch in thickness. It consumed 100 hides and cost about $1200.

ITALY shows a strong symptom of genuine *renaissance* in the activity and ambition of her manufactures. No less than 1,365 exhibitors are already enrolled from Italy in the Paris Exposition

METALLIC ZINC PAINT.—English papers notice a novel preparation of metallic zinc which is easily pulverized and applied with oil as a paint for ships' bottoms, to prevent fouling.

OBITUARY.

Science in the United States has lost one of its brightest stars by the death of Prof. ALEXANDER BACHE, which occurred at Newport, R. I., on the 17th of February. A more extended notice will be given next week.

Tunnel, Tunnel, Tunnel.

A number of Pittsburgh capitalists have under consideration the construction of a tripartite tunnel from Saw Mill Run to Pittsburgh, Alleghany and Manchester, under the Ohio and Monongahela rivers. A bridge of like character was contemplated some years ago. The impression now is that a tunnel will not cost more than the bridge while the advantages are with the former.

Another tunnel is talked of to pass the trains of the Great Western and Michigan Central Railways under the Detroit River, over which they are now carried by the new iron ice boat. Borings are said to have shown a favorable stratum of clay.

A bill has been passed by Congress authorizing the construction of a tunnel under the Mississippi River at St. Louis.

THE MARKETS.

We noticed in our last report the prosperity of the European manufacturing interests, and with the consequent cotton demand of Great Britain and the Continent. It may not be unint resting to note in this place from whence the supply for the year may be reasonably expected.

It is now generally conceded that neither India nor Brazil are to be relied on the present season for meeting this demand on anything like the scale of last year; in the former country the falling away from the unprecedented crop of the past season must be very heavy. Egypt was expected at one time to furnish thrice as much as last year, but this estimate is now materially reduced. Too much has also been expected from Turkey and the neighboring states, and though some slight increase may be realized both from these quarters and the West Indies, the main supply must still be from the United States. Last season there were shipped from this country to Europe 1,935,000 bales of cotton, of which amount Great Britain absorbed 1,303,000. Estimating the crop of this season at 2,000,000 bales, allowing three-eighths of it for home consumption, there will then be 250,000 for shipment to the Continent, and 1,000,000 for Great Britain, a falling off in the latter's supply of 302,000 bales, and when this is added to the probable deficiency from India and Brazil, it is evident a demand will be created which must make prices correspondingly and quite uniformly high.

PETROLEUM.—Total foreign exports from the United States from the beginning of the year to the 9th of this month was 4,141,287 gallons, showing a falling off from shipments of the same time last year of 2,393,605 gallons, and an increase from 1865 of 2,473,585 gallons. The market at date is weak, with a fair demand for crude.

COTTON.—A continued falling off in receipts from the interior has had the effect of stimulating exporters and speculators to purchase freely at full prices, in anticipation of an improvement in the Liverpool market.

METALS.—The demand for ingot copper is still very limited, but prices are firm, with very little offering at present rates. The iron market continues dull. Some improvement is at length noted in pig lead. The demand for foreign spelter is light, but the advanced price is well sustained, Silesian selling at 6¾ cents gold. The anticipation of a higher tariff on steel has had the effect of creating considerable activity on the part of purchasers. Pig tin is offered quite freely, and a slight decrease in prices is noted. Zinc continues dull.

PULLEY SUSPENSION HOOK.

It is a dangerous and trying labor to suspend the upper pulley of a horse hay-fork from the meams over the hay mow, and troublesome to shift the point of suspension as the work proceeds. The engraving shows a very simple device to fasten such tackle without the necessity of climbing. It is a double hook of iron, the lower curve holding the pulley, and the upper intended to engage with a beam or any convenient projection. An arm is pivoted at A, which is secured to the wooden lifter, B, by which the hook, pulley and connections may be raised by a pole, C. By the same means the ho k and tackle may be removed from place to place as required. This device appears to be adapted for a number of purposes where a hoisting tackle is required. It is the subject of a a patent obtained through the Scientific American Patent Agency, Nov. 13, 1866. All letters relative to the device should be addressed to Miller & Plants, Rollersville, Sandusky Co., Ohio.

KEILER'S LAMP CHIMNEY CLEANER.

The introduction of coal oil as a common illuminator has in a large measure superseded the use of common oil lamps and candles, but while it is vastly superior in light-giving qualities, it has its disadvantages, one of the chief of which is the annoyance of the glass chimney, which must be kept clean that we may derive the full benefit from the lamp; and this cleaning is a nuisance, as it is commonly performed. The implement herewith illustrated is intended to make this labor light, to insure a perfect cleaning of the interior of a shade without the expenditure of much time or the danger of breaking the glass. It is perfectly simple, merely a bladder or a bag of india-rubber, or other elastic, to be introduced to the interior of the glass and inflated to fill the whole space. The bladder is secured to the end of a hollow handle and may be covered with a cloth of cotton or woolen. Air is blown into the hole at A, and escapes through another aperture in the interior of the bladder. When the bladder is filled, which can be done in a breath, the thumb is placed over A and held while the glass is cleaned. This device will recommend itself to all housekeepers, and others who use glass shades and lanterns. A patent was issued for this improvement, Sept. 25, 1866, to Levi Keiler, whom address at Catawissa, Pa., for information in regard to state and county rights, etc.

PETROLEUM AND PARAFFINE are manufactured in Wales and Scotland from the shale or refuse of the bituminous coal beds. It is estimated that about twenty gallons of crude oil are obtained from a tun of coal, and that between seven and eight millions of gallons per annum are manufactured in the retorts of Scotland alone. The principal supply, however, is from the oilwells of Pennsylvania.

A METHOD OF CONTROLLING THE PRODUCTS OF THE BESSEMER PROCESS.

PREPARED FOR THE SCIENTIFIC AMERICAN BY DR. ADOLPH SCHMIDT.

The greatest and till now unconquered difficulty in conducting the Bessemer process, is to determine exactly the moment when the process has to be interrupted for getting a product combining certain precise qualities. The most experienced engineers and managers in every country where the process is carried on, have not yet been able to find out a mode of working by which it might be possible to obtain with certainty exactly that kind of a product they wish to get at the time. Different ways have been proposed and tried to overcome that difficulty, but all have failed. This will not appear so very astonishing when it is considered that the time during which the process must be interrupted, if any kind of useful material is to be obtained, lasts no longer than about two minutes and a half, and that during this short period the metal passes rapidly through all the chemical and physical conditions between that of a very hard cast-steel and that of a soft and highly ductile wrought iron.

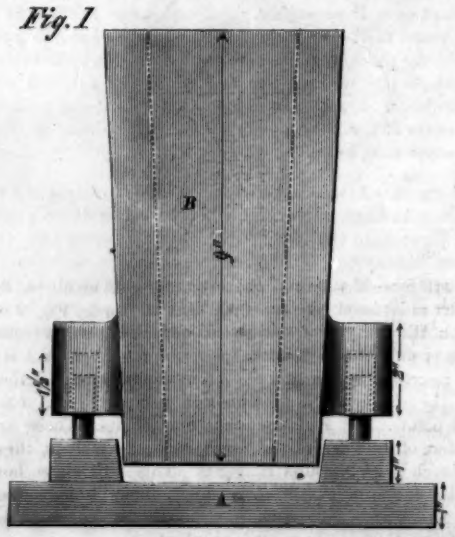
The only important progress that has been made in this respect is by the final addition of spiegel or other pig iron at the end of the process. This method facilitates beforehand, to a considerable degree, the acquirement of the desired result, because the moment when the metal is in the condition of wrought iron, or almost entirely decarbonized, it is easier to be recognized than any other, and the addition of more or less molten pig iron, after this moment has been observed, and the process is interrupted, offers a convenient expedient to effect a partial retrogression of the process and to obtain a more or less hard product. This invention was therefore a real and general improvement.

All the progress that has been made, besides this, in the certainty of the results to be obtained by the Bessemer process, chiefly consists in the practical experiences and observations of men who possess such theoretical knowledge as is necessary for viewing the phenomena occurring during the process, in the right way, and for drawing from the facts the right practical conclusions.

But neither these more local improvements, nor the beforementioned method of working, have been able to overcome sufficiently the uncertainty clinging to the results of the process; and it is an incontestible fact that the quality of its product is generally very unequal, and quite uncontrollable during the course of the process. The consequences of this must evidently be very bad, and as injurious to the manufacturers of the raw ingots as to those who purchase to rework them.

When the ingots are cast, the manufacturers generally do not and cannot know what kind of metal they consist of, what qualities this metal has, nor what purposes it is good for. Only vague suppositions can be made by the manager of the process from the general manner of its going on, from the phenomena it exhibits to his observation during its course, from the appearance of the metal in its fluid and in its chilled state, and from the color and appearance of the slag. But how very uncertain such suppositions are, is known by every one who has often assisted in the process and noticed the illusive character of the phenomena observed. These appearances in the metal and slag are often equally deceitful.

Fig. 1



The ingots are sold afterwards or transmitted to those who have to work them, under the general name of "Bessemer metal" or "Bessemer steel," and it is not discovered of what kind and quality they are until after they have been heated and hammered or rolled, when it is too late to determine for what purpose they would suit best. So it happens in England. For instance, it frequently happens that ingots which would make first-class tires are used for plates, and make bad ones, and ingots which would prove an excellent material for making chisels and other instruments, are rolled out into rails, which prove to be poor and break.

In a word, bad or at least unreliable finished products are the consequence, which necessarily brings discredit on the process, spoils the market, lowers the prices, and, in general, hinders a rapid extension of this important branch of manufacturing business, as well as a rapid increase of the use of its products.

To prevent so disadvantageous experiences by the Bessemer manufacturers of this country, the following communication will indicate a simple and inexpensive method, by means of which every manufacturer can ascertain for himself the qualities of his ingots after every charge that has been made, and classify them according to their qualities. The method is a modification of one used in Austria with eminent success.

When at the end of every Bessemer charge the molten metal has been poured out of the inverter into the large ladle, it has to be left till the ebullition caused partly by the continued chemical action between the metal and the spiegel or pig, partly by the vapors still escaping from the lining of the ladle, has almost ceased. Then one or two ordinary ingot molds should be filled to get the small impurities and the less hot parts of the metal which sometimes stick to the bottom, out of the ladle; then somebody fills an ordinary small casting ladle with metal, and casts from it a small testing ingot, generally between ten and twenty pounds in weight, by pouring the metal into an iron mold prepared for that purpose. This operation may also be done directly from the large ladle by bringing its muzzle over the small mold; but the use of a well-dried and warm ordinary casting ladle is preferable for very small ingots. The shape of the mold is of no very great importance. I think, however, that the best shape is the one represented in the annexed engraving. It is that of a reversed trunk of a four-sided pyramid. The shape is pyramidal—though but slightly so—because the ingot is easier to be taken out of such a mold than out of one made like a straight column. The pyramid is reversed in order that the gases frequently developed during the operation of casting, may have a better escape, and that the slag or other light impurities may find a larger surface to be gathered upon. I propose the section to be quadrangular, because in this form the small ingot is easier to be seized and handled, and easier to be forged and rolled than with most other shapes, and because at the same time the ingot gets some angles which are sharp enough for the degree of fusibility of the hot metal to be observed by the aspect of the edges of the ingot. The mold is composed of two parts, both of cast iron. The bottom plate, A, is planed at the middle part of its surface. Two wrought-iron bolts are cast in it and stand out about an inch and a half over the top of two massive flanges about one inch high. The pyramid, B, planed at its smaller end, has two ears, about two inches high, with circular holes an inch and a half deep in the lower surface. These ears and holes are made so as to fit the position of the flanges and bolts on the bottom plate. These two parts of the mold are fixed together simply by passing the bolts of the plate into the holes or the ears of the pyramid, to prevent the mold from falling over during the casting operation. The mold has to be made very strong in all its parts and dimensions, so as not to break when the ingot is knocked out of it afterward. The weight of the ingot for testing may be between eight and twenty, and in single cases fifty or sixty pounds. In places where a proper rolling mill or good-sized hammer can be used, it will be well not to have this weight less than fifteen pounds. But where the whole testing operation has to be made by hand, smaller ingots are preferable. The dimensions of the mold depend upon the desired weight of the ingot. If the upper opening of the pyramid is made three inches square, the lower one two and a half inches square, and the hight nine inches, and if the mold is only filled with metal up to a hight of about eight inches, the upper part being filled with sand, ingots of good proportions and of somewhat over fifteen pounds in weight will be obtained.

Fig. 2

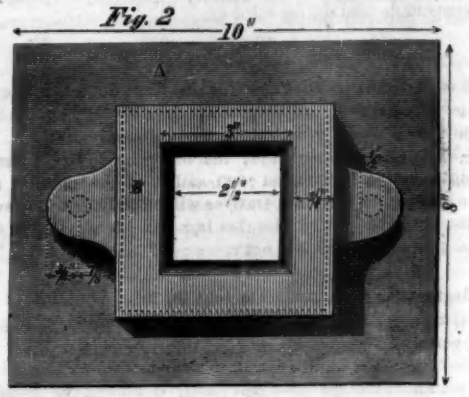
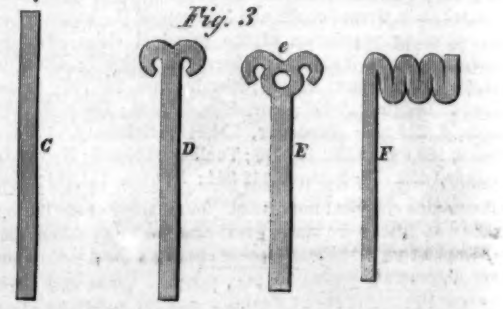


Fig. 3



Such an ingot can, when previously heated to a very light red and nicked, be easily broken, under a steam hammer, to show the fracture of the raw metal, if this is required.

As soon as the small ingot, cast by means of the mold above described, has hardened, the pyramidal part of the mold containing the ingot, is taken away from the bottom plate, set upside down on a frame a little wider than the large opening of the mold, but having the same form of section, and the ingot being still slightly red-hot, is knocked out by blows of a hand hammer on a piece of iron applied to the small end of the ingot in the mold.

After having been examined as to its exterior appearance, the ingot is taken without delay into a heating furnace, heated to a uniform good yellow heat, and hammered or rolled out to a rectangular or quadrangular bar of not over a square inch in section. This bar is cut instantaneously in pieces of one and a half or two feet in length, and the pieces are brought over to a small forge, there to be tested by a blacksmith. If there is no bar mill nor steam hammer at the works, the ingot, being made of a smaller size, is to be treated at the small forge exclusively.

The fuel used in the small forge for the following operations should be charcoal. If mineral coal is used it must be carefully selected so as to be free from pyrites and other minerals or compounds containing sulphur.

TESTING.

Testing has for its object to discover if the metal is of a good or bad quality in general, as well as to investigate its special qualities and aptitude. It is done by forging, hardening and welding: to which three kinds of manipulations there may afterwards be added experiments in relation to the tensile strength and the chemical composition of the metal. The three first-named simple operations will be sufficient, however, for the ordinary and regular testing and classifying of the metal produced by each charge.

FORGING.

Forging is done by heating one or several pieces of the metal in a smith's fire to a good yellow heat, and by hammering, working and distorting it in different ways to show the malleability, the toughness and the equality of structure in the metal. This can be done by all the ordinary kinds of blacksmith operations. A very good way to show the two last-named qualities of the metal, I consider to be the following forging operation: Forge a bar about one-eighth inch thick and one-half inch broad. Cut one end straight off, and split the bar in this place and in the middle of its width to a length of one inch or more; bend the two separated parts around on both sides, and make a large round hole to the middle of the intact part of the bar, very near the end of the split, so as to present the succession of shapes, C, D, E, as shown in Fig. 3. If the metal at *e*, in the top of E, gets very thin by extending the hole, without cracking through to the split, the metal is proved to have a high degree of toughness and a very uniform structure, equal in different directions. An ordinary and well-known testing operation, which should never be omitted, is to bend a bar similar to the one above described in several different places, and to hammer the bent parts close together, to see if the metal is liable to crack by bending. The shape of the bar, produced by this operation, is represented at F, Fig. 3.

Every good kind of metal should withstand these two trials without injury. If not, it is not blown enough, or two much, or it contains chemical impurities. In all these or similar operations, at first to be made, great care has to be taken that the temperature of the metal never exceeds a good yellow and never decreases below a dark yellow heat. For in both these instances the metal, being steel-like and perhaps of an excellent quality for many purposes, may crack, owing to the improper temperature. If the bar cracks more or less easily at the yellow heat, it has to be tried afterwards at a white welding heat, and if it keeps good in this state, it shows that the metal is a kind of inferior wrought iron. In all cases the metal has to be tested by simply hammering it at a red heat to see if it is inclined to be red-short.

HARDENING.

Hardening, considered as a testing operation, is chiefly employed to discover if the metal is of a steely nature, because steel is capable of being hardened and tempered and wrought iron is not, or but very slightly. A bar half an inch square is prepared, heated in the smith's fire to a light red, and dipped in water till it is cold enough to be held in the hand. The bar is then laid across an anvil, and strokes are applied with a hand-hammer on its free end till it bends or breaks. If the bar so treated does not bend at all, only giving way for a moment to the blow, instantly returning to its former shape by reason of its elasticity, and breaks at once by a harder blow, exhibiting an even or conchoidal fracture, fine-grained structure and bluish gray color, we have a hard kind of steel before us. If, on the contrary, the bar does not show any degree of hardness or elasticity after having been suddenly cooled in water, but gives way to each stroke applied to its end without returning to its original shape, and is so bent gradually to a right angle or further, showing, when finally broken, an uneven and fibrous structure and pretty dark color, the metal is wrought iron, and the results obtained in forging will show whether it is a good or a poor kind of iron. But most of the products of the Bessemer process are of a quality between the first mentioned and the last kind. Nevertheless these products, when free from chemical and mechanical impurities, prove useful and even very excellent for certain purposes, and therefore a well-determined classification of these different kinds of metal, as proposed hereafter, will doubtless be exceedingly valuable.

WELDING.

Welding, when tried with the metal, will serve to complete the tests of the qualities and the degree of usefulness of our Bessemer products.

A bar about half an inch broad and a quarter of an inch thick, is heated in the smith's fire, bent in the middle and hammered down, so that the two parts come together closely. It is then put back into the fire to be heated to a regular white welding heat, using some pure sand or powdered puddling cinders, hammered, cooled in water and broken. If the metal has the welding property in a high degree, as pure Bessemer metal generally has, the seam should not be at all visible in the surface of the fracture.

The result of this operation, however, very much depends on the skill and good will of the operating workman, and a good and reliable smith has therefore to be chosen for the purpose. If the metal is of the harder kinds, hammering has to be done with care and caution.

Welding of Bessemer metal is, in general, one of the most interesting and yet least understood points in this new branch of industry. Ordinary wrought iron welds better than ordinary steel, and corresponding with this fact it may be said that the softer kinds of Bessemer metal weld better generally than the harder ones. But even the hardest Bessemer product very seldom offers in welding so great difficulties as ordinary cast steel, and all steel-like kinds of it are, when compared with the corresponding kinds of steel made in the ordinary way, good welding materials. It occurs, however, not as a rare but a very strange fact, that metal of some one other Bessemer charge, independent of its other qualities, proves entirely unfit for perfect and reliable welding. I shall, perhaps, on some other occasion, communicate some observations on this subject. Remelting the pig iron used in the process, with the mode of doing it, seems to affect this property of the metal.

The three simple testing operations just explained are generally sufficient to determine very nearly the kind and the aptitude of the material produced by a Bessemer charge. However, the trial of the tensile strength and the chemical analysis of the metal are often of great importance too, and every Bessemer works should have the apparatus necessary for ascertaining them. But they require a longer time and may be done after the tests just described. The modes of conducting them are similar to those employed for other kinds of steel and iron.

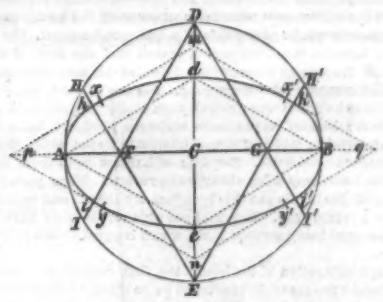
It is also useful to carefully observe the color and qualities of the resulting slags. There will always be found a more or less visible connection between their appearance and the qualities of the metal, if one and the same kind of pig iron is used.

Science Familiarly Illustrated.

How to Draw an Ellipse in Isometric Projections.

J. Konvalinka, of Astoria, L. I., gives the following method for drawing an ellipse such as is required in perspective drawing for the representation of a circle; where the three principal planes are viewed at equal angles and the side horizontals drawn at an inclination of 30°.

First, draw the two diagonals, A B, D E. Then with the radius of the circle, which is to be represented in perspective, describe the circle, A D B E. From the points, D and E, and with the radius of the circle mark on it the sextant and points, H H' I I'. Then draw the lines, D I, D I', E H, E H'. From the crossing points of these lines, F and G, describe the arcs, *i* A *h*, and *h'* B *i'*, which form the ends of the ellipse. These are then united by the arcs, *h d h'* and *i e i'*, from the centers, E and D.



This will more closely and correctly represent an ellipse for the above-mentioned purpose than that shown in Fig. 2 on page 21 of the present volume of your journal. It will coincide in eight points with a true ellipse. Suppose A *d* B *e* A is a square, inscribed within, and *p m q n p* a square, circumscribed around the circle and represented in perspective. A *d* B *e* are four points. *x x' y y'*, are other four points. These are the centers of the sides of the outer square, which at these points touch the ellipse as tangents. This will show how little the curve herewith represented differs from a true ellipse, and it also affords an easy means for correction by hand, if something more exact is required.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Action and Reaction—The Proper Unit of Measure for Force.

MESSRS EDITORS:—The interesting and instructive article in a recent number of your paper, by Prof. Seely, on the "Recoil of Guns," shows a great intimacy with the subject, and is practically valuable. I wish, however, to object to the doctrine therein advocated, that action and reaction are not always equal, and to the concomitant doctrine, which was advocated by the celebrated Leibnitz, that the force of a moving body is proportioned to the mass into the *square* of the velocity instead of the simple velocity.

Since the velocity of the gun is clearly shown to be to that of the ball, inversely in proportion to their respective weights, it undoubtedly follows that if we admit the Leibnitzian measure of force to be correct, i. e, the mass into the square of the velocity, the force of the powder will, under this supposition, be expended *unequally* between the gun and the ball, that acquired by the latter being as many times *greater* as it is lighter than the former. But the truth of this supposition is the real point at issue, and it was for many years the subject of a violent controversy between Newton and Leibnitz and between their respective followers. It was at last generally admitted that the dispute was one of definitions rather than facts, either party being in the right providing his definition of force, and of its mode of increase or *diminution*, could be admitted as true. Since that time the Newtonian measure, the mass into the velocity, has been generally adopted as the measure of the *quantity* of a force or a motion. Some attempts have been made to revive the Leibnitzian view of the subject, and Prof. Treadwell read an ingenious paper for that purpose before the American Academy at Boston, some years ago. The eminent mathematician, Prof. Peirce of this country, and the distinguished Dr. Mayer of Germany have also, though somewhat less decidedly, expressed themselves in favor of this revival. The difference in the two ways of estimating the quantity of force associated with a given body in motion, depends upon whether the *time* which elapses, or the *space* which is passed over, while the entire force of the moving body is imparted or overcome by a uniformly accelerating or retarding force, is made the coefficient of the unit of measure.

The Newtonian, and it seems to me, the true conception of the subject is this:—a uniformly acting force, like gravity at the earth's surface, for instance, will add equal increments of force to a body upon which it acts freely, in equal periods of time, and its entire force, since its velocity increases uniformly, is simply as its velocity, and not as the square of its velocity, for if unequal increments are added in equal times, then the cause must act variably, which is contrary to the supposition. The passage of a body through space is not an evidence of the *expenditure* of force, since a moving body, if unopposed, will traverse an infinite distance. A certain portion of the space traversed, then, has no relation to the expenditure of force, and it accordingly follows that the entire space is not a proper co-efficient of the force expended.

Suppose a person to walk with a certain uniform speed upon the deck of a steamboat. He will perceive no difference in the amount of effort required, whether the boat be stationary or in motion, or whether the direction in which he walks is the same as, or opposite to that of the boat's motion. But if the Leibnitzian measure of the entire quantity of force be correct, the force expended under the different circumstances must be widely different. If we suppose the boat's velocity to be 12 miles an hour, while the person walks at the rate of four miles in the same direction, the additional velocity thus attained will impart an increased amount of force beyond that attained by walking on a stationary boat in the proportion of 112 to 16, or 7 to 1. For the square of the walking velocity on a stationary boat is 4×4=16, while the force required to walk forward at the same rate of speed while the boat is in motion would be determined thus: The square of the velocity unincreased by walking would be 12×12=144, increased by walking, 16×16=256, the excess being 112 which is the Leibnitzian value of the different amounts of force in the two conditions. This discrepancy of theory with fact, is greatly increased when we consider the immense velocity of the earth in its motions around its axis and around the sun. The reasoning by which the attempt is made to overthrow the almost self-evident axiom of the equality of action and re-action also leads to the fallacy of applying a measure of one kind to estimate the quantity of something of an entirely different kind. While the product of the mass into the square of the velocity or the equivalent product of the uniform or average intensity of force into the *effective space* is a proper measure of other space products or space effects of the same kind, it does not follow that it is a measure of simple and absolute force.

The proper definition of force seems to me to be,—*that which when associated with water causes it to move.* No mode is known by which we can determine the *absoluteness* of rest or motion and no *practical* error, is found to arise in assuming that the motion of any given body is merely *relative*, or in considering the body as at rest, when referred to another body moving with the same velocity, and in the same direction. The above definition of force thus becomes sufficiently comprehensive to include all that causes *change* of motion whether by acceleration, retardation or change of direction. Since no error ensues from the assumption of the *relativity* of motion it follows that equal increments of force are added or subtracted, in equal units of time, when the velocity of a body is uniformly accelerated or retarded, and consequently that the measure of force in the body is found by multiplying the *mass by the velocity.*

I am, however, quite ready to admit that, while it is not the measure of absolute force, the product of the mass into the *square* of the velocity is the measure of *practical results.* All the operations of mechanics, and even of every-day life, consist in *overcoming resistances*, by which is meant, changing the positions or relative positions of bodies or parts of bodies where *effort* is required. This is called the *performance of work*, and is measured by the product of the resistance into the space through which it acts, or, what amounts to the same thing, the mass into the square of the velocity of the body doing the work. It includes what is called the penetration of bodies, and the overcoming of friction, &c, in general, of any kind of resistance. The force acquired by a body falling one hundred feet in vacuum, will lift another body, if thus expended, to a height of one hundred feet or it will lift ten similar bodies to the height of ten feet, or one hundred similar bodies one foot, etc. Since the velocities attained by falling bodies must be squared to make them proportional to the distance fallen, it follows, that these *space effects* are proportional to the squares of the velocities of the gun and ball, are proved to be inversely as the masses, we readily perceive that equal quantities of force are acquired by the two, and that "action

and reaction are equal and opposite," as was propounded and demonstrated by the immortal Newton. We also perceive that the *space effects*, the *penetrative power* or the power of *performing work*, are *unequal* being in inverse proportion to the weights or in direct proportion to the products of the masses into the squares of the velocities.

HENRY F. WALLING.

New York, Feb., 1867.

Patent Law Amendment.

MESSRS. EDITORS:—I am at a loss to know why Congress repealed section 6th of the patent law of 1842. It was certainly not done in the interest of inventors. The way the law stood, as I understand it, parties unauthorized by patentees or their assignees could not stamp a patented article nor use it unless stamped, without making themselves liable to a penalty of not less than $100 and costs. As it stands now, no one is required to stamp a patented article. For anything I can see in section 5th, persons may use patented articles provided they are not stamped. If patented articles are not stamped there is no very great inducement to stamp unpatented ones.

The two sections together are a protection to inventors to the extent of the penalty attached. As the law is now it amounts to very little. If you take the same view of the matter I do you will use your influence to have section 6th re-enacted, but I am no lawyer.

You may be pleased to know that I am doing very well, for a poor man, with my patent obtained through your Agency. I made a trip this month with my bee hive, and in four days I cleared $150, and I have done better in less time.

JAS. S. MARSHALL.

Greenville, Pa., Jan. 29, 1867.

[We think the amendment to which our correspondent refers is a very good one. If patentees fail to stamp the date of their patents on the articles offered for sale, or upon the packages so as to give public notice of the existence of the patent, they cannot recover from infringers.—EDS.

Proving Guns by Measurement.

MESSRS. EDITORS:—In the London *Mechanics' Magazine* of Dec. 21, 1866, appears an account illustrated by engravings of an instrument for "proving guns by measurement," by Mr. Joseph Whitworth. This instrument is identical, both in form and principle, with the star gage, which, for at least a quarter of a century, has been used in this country by the Ordnance officers of the Army and Navy for proving guns by measurement, but it is described by Mr. Whitworth as designed by him.

The star gage is believed to be of French origin, though it has been much improved since its introduction into service in this country, but the "Calibre Star," described by Tousard, and referred to in an order of the Duc de Choiseuil, dated March 31, 1766, in relation to the inspection and proof of French cannon, is undoubtedly the original of the present instrument.

As the star gage is fully described both in the Army "Ordnance Manual" and the "Instructions for the Inspection and Proof of Cannon," for the Navy, as well as in various works on Ordnance and Gunnery published in this country, it is not necessary to describe it here; but any person who will take the trouble to compare any one of the above cited descriptions with that of Mr. Whitworth, will see at once that the instruments are the same.

How then can Mr. Whitworth claim this instrument as having been designed by himself? Can it be possible that so distinguished a mechanician and artillerist as he, could be ignorant of the existence of an instrument that has, for so long a time, been considered as almost absolutely essential for the measurement of guns? Or has he really made an invention which is already a hundred years old! U. S. N.

Washington, D. C. Feb. 7, 1867.

A Substitute for Writing Ink.

Messrs. Editors:—Not long since, I read in one of your papers a dissertation relative to the qualities of writing ink. I will simply state to you, that for the last twenty years, I have been doing a large amount of writing, and that during that time, I have used common India ink, simply disolved in water. It being composed of carbon, and little else, it will keep in any climate or place from year to year, perfectly sweet. Even freezing does not injure its good qualities, a simple cover is all that is required to prevent evaporation and keep the dust from falling into it. I have never used any kind of ink that would flow from the pen with that ease and agreable freeness that this *hydrate* of *carbon* does. The stroke of the pen made with it is quite black if desired, and will endure unchanged to all time provided the paper or parchment remain sound, and even papers that have been burned and not fallen to pieces, with this kind of writing upon them, remain quite plain to read. F. S.

[Ordinary writing ink is a modern invention. The ancient ink was such as our correspondent finds best. It is still used by the Chinese and Japanese.—Eds.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,760.—COATING FOR PAPER AND OTHER MATERIALS DESIGNED TO RECEIVE LEAD PENCIL MARKS WHICH MAY BE REPEATEDLY EXPUNGED WITH MOISTURE.—Sylvester Schoonmaker, New York city. Dec. 24, 1866.

2.—BENCH PLANING MACHINE.—Joseph Jones, Newark, N. J. Jan. 1, 1867.

30.—WATER DELIVERY NOZZLE, IMPROVED IN THE EXTINCTION OF FIRE.—William Barbour, Lawrence, Mass. Jan. 5, 1866.

46.—AUGER.—Amasa C. Kasson and Nelson C. Gridley, St. Louis, Mo. Jan 7, 1867.

70.—ELLIPTIC OR OTHER ELASTIC SPRINGS.—Edwin M. Chaffee Providence R. I. Jan. 11, 1867.

[Reported for the Scientific American.]

MANUFACTURE OF BEET SUGAR.

BY JOSEPH HIRSH, PH. DR.

THE production of sugar from beets, and the establishment of a branch of industry which has now attained huge proportions, is not, cannot be, traced to a mere accidental discovery, but is the legitimate result of careful and long-continued observation, study and diligence, ever combatted by a cold northerly climate. A detailed account of the advance in the manufacture would show progress made step by step against the greatest prejudices, while ridiculed and pronounced hopeless even by such men of science as Liebig. Yet, in spite of almost insurmountable difficulties, the world did move; and while France in 1829 produced 80,000 pounds of beet sugar, the supply in 1858 was increased to 98,432,182 pounds, or 492,360 tuns, made in 600 manufactories.

Only so late as 1747, the German chemist, Markgraf, published the results of his experiments with different roots, especially the beet and sugar beet, in which he proved the presence of crystallizable sugar, unknown or doubted until then. His discovery remained a scientific curiosity merely, without bearing any practical results; and it is to his talented disciple, Francis C. Achard, that the credit belongs of examining anew all the plants which, in the cold northerly zone of Europe could be raised with profit for the production of sugar, and of being the pioneer in the art, by erecting in the year 1796 the first large establishment for the production of beet sugar, situated in the county of Cuneva, in Silesia. In 1799 and 1812 he published his first complete treatise on beet sugar, which was so precise, distinct and plain, and moreover was treated in such a thorough practical manner, that it aroused the attention of the English sugar merchants, and caused them to make him the generous offer of 50,000 Prussian thalers, on condition that he would discontinue his experiments with beet sugar, and so kill this industry at its birth. Nobly refusing this offer, the sum was subsequently quadrupled, in the hopes of inducing him to publish another work setting forth that his enthusiasm for the beet sugar manufacture had carried him too far, and that experiments on a large scale had not realized his expectations. This offer was also declined. The English merchants had now become thoroughly alarmed at the progress the new manufacture was making on the continent, and made one last effort to crush it, by engaging Sir Humphrey Davy to write a work in which he sought to prove that beet sugar was bitter. But even this very learned treatise was of no avail, for all over Europe beet sugar was consumed, and its bitterness was pronounced to exist only in England. Napoleon's continental blockade, at the beginning of the present century, stimulated the new industry; and though the enterprise was encouraged by all the crowned heads of Europe, yet the main practical and successful aid was given by Napoleon I., to whom belongs the honor of being the second founder of the beet sugar industry.

The discussion of the beet sugar manufacture should be preceded by that of the beet itself, and its cultivation. The sugar beet cultivated in Europe is known under several varieties, the favorite one being the Silesian. A cross section of this beet exhibits a white, dense structure, in a few of its varieties, having concentric rose-colored rings about three eighths of an inch wide. Its juice has a concentration of 8° to 9° B, and contains but a small proportion of impurities. A second variety of beet is the Burgundy, which grows out of the ground, has a loose porous texture, a great deal of highly diluted juice, and on this account is undesirable for the production of sugar. The properties of a good beet are the following: uniform shape, and if possible without branchings or forks, as these are likely to retain impurities from the field, impart them to the juice, and impede the production of crystallizable sugar. The beets should not weigh less than one pound, nor more than five, smaller ones being washed and ground only with difficulty, while those larger generally have a too diluted juice. The beet should further have a firm, uniform texture, should make a loud cracking noise on breaking, and should sink in water. Those that break readily are easily ground to pulp, a necessary property, while half dried old beets are somewhat elastic, and therefore difficult to be reduced. It is also desirable that the beet should be white, although this is not necessary. The juice should be sweet, concentrated, and contain few impurities, its concentration varying from 4° to 12° B. The beet should not grow above the ground, as that portion has a loose texture, a thick skin, a watery juice, is rich in salt and poor in sugar, and freezes easily during cold winter nights. To obtain these results the ground should be well plowed, manured a year before planting (the best previous crop being wheat, although beets may be grown successively for a number of years without exhausting the ground). Nitrogenous manure is to be avoided, as it increases the nitrogenous protein substances of the beet, consuming its entire vital power while its proportion of sugar remains small. The best time for sowing is between the latter part of March and the first of May. The sowing is made diagonally through the fields, as this uses space more economically than the square way of planting. The seed should be not over one year old, and is to be put in the ground abundantly to insure a full harvest. Rainy seasons are dreaded, as too much moisture produces large beets containing a watery juice, many salts, and but little sugar, while dry seasons commonly produce good beets. The time of harvest lasts from September to October, the latest crop being always the sweetest. When pulled the loose dirt is shaken off, the leaves and side branches are cut off, and remain to act as manure for a future crop. The yield per acre varies from 12,000 to 18,000 pounds, the average being perhaps 15,000, which is equal to about 1,200 pounds of raw sugar.

The thorough cultivation of the beet is the first condition of success, as a poor beet opposes too many difficulties to its economical employment. The best ground for beets is black mold, humus or sandy or limey loose ground; clayey soil, as it retains too much moisture, is less desirable. The beets, after harvesting, must be preserved from frost, by storing in ditches three feet deep and three feet wide, in which the ground is pounded firmly, covered with straw or boards about four inches, then with a layer of earth about six inches high. At distances of six feet bunches of straw are placed in the ditches, to act as escape tubes for the vapors arising from the beets. These ditches are generally made 60-120 feet long, the piles of beets reaching three feet above ground. Occasionally these piles are made entirely above ground and covered with a layer of earth ten to twelve inches high. Thus preserved the beets will keep until March. In Russia, occasionally, wooden sheds are used, under which, upon strips of wood or in baskets, the beets are piled four to six feet high; this mode of keeping is cheapest in the end, although the first cost is considerable.

The production of juice in a pure state necessitates the thorough washing of the beet, for which purpose a drum is employed, made of wooden strips, about ten feet long and four feet in diameter. The drum lies somewhat inclined to one side, in a tank filled with water, into which it reaches to the depth of a foot. The beets fall from a large hopper into the drum at one end, passing out at the other upon an inclined plane, whence they are conveyed by a large archimedean screw, traveling in an upward direction against a continuous current of fresh water, until the cleansing is completed.

After washing, the decayed portions, beet tops and rootlets, parts containing juice poor in sugar and rich in salts, are removed by revolving knives, and what remains is thence conveyed to the crusher or rasping cylinder, revolving six hundred times per minute, and is rapidly reduced by it to pulp, and in this condition is removed to the presses. The rapidity with which this operation is completed corresponds to the the acuteness of the angle between the direction of pressure of the beet, and the tangent of the cylinder at that point; for if that angle is a blunt one, the saws will simply scratch and not cut the beet, hence the pressure must always be directed against the lower side of the cylinder. During the operation of crushing, a continuous current of water cleanses the cylinder, dilutes the juice, and facilitates its removal from the pulp. The latter contains now forty per cent. in volume, or about one per cent. of its weight, of air. The cylinder and pulp box are cleaned every six hours, to prevent oxidation of the juice.

The pulp, as fast as made, is spread on cloths made of raw silk, the whole being supported by perforated plates of sheet iron. These charges, to the number of thirty or more, are placed under a hydraulic press, and a pressure is applied at first of from fifteen to twenty atmospheres to the square inch, gradually increasing to one hundred and twenty to two hundred atmospheres.

The pressing surface is generally twenty-four inches, and each press cloth is charged with sixteen pounds of pulp. The pressure is regularly increased for from eight to fifteen minutes, remains thus for some five minutes, and is then released; the juice expressed during this operation ranges from eighty to eighty-four per cent. of the weight of the beets.

Beside silk, wool, horsehair and hemp, are used for press cloths. Frequent washing of these is necessary, ammonia commonly being added to the water to neutralize acidity, and dissolve slime; soda and lime were formerly used for this purpose, but it was found that these soon weakened the fiber of the cloth. The pressed cakes are used as cattle feed.

Another method of separating the saccharine juice from the pulp, first introduced by Schöttler, is by placing it in a metallic cylinder finely perforated and caused to revolve at the rate of one thousand revolutions per minute. The centrifugal force causes the juice to be expressed, but a great amount of fine pulp is driven out with it through the meshes, causing trouble in the subsequent operation of defecation. By this method, also, an immense amount of froth is produced, which has to be run separately into a vat, and condensed with steam. A charge for a centrifuge is two hundred pounds, and this is exhausted in fifteen minutes, or thirty charges can be made easily in an hour. Among other methods which have been used may be mentioned ordinary rollers, pressure with compressed air or gases, there have been tried, though with but little success. The method of maceration lately come into use, recommends itself for its completeness and simplicity, also in that it does away with expensive pumps and presses. In the cells of beet pulp, in contact with water for some time, an endosmotic process is carried on, the water entering the cells and giving out the saccharine juice, until the liquid within and without possesses an equal density. If, then, one hundred pounds of beets, reduced to pulp containing ninety-six pounds of juice, are mixed with an equal weight of water, endosmosis will produce a juice of half the original strength, but double the quantity. If this be withdrawn, and the same proportion of fresh water be again added, the juice contained in the cell of half the original strength is again reduced, possessing then one quarter of the original strength. If a juice contains eighteen per cent. of sugar, which is a fair average sample, the progress of this reducing process for six consecutive times leaves a juice in the pulp of but one quarter per cent. of sugar, or one almost free of saccharine matter. The juice obtained by all these dilutions is too watery for economical evaporation, and must be concentrated by the same process by which it was diluted.

The juice obtained from the first dilution of the original juice of sixteen per cent., contained eight per cent of sugar. If this now be brought in contact with its weight of fresh juice of sixteen per cent., a mixture will be the result containing twelve per cent. Continuing this process six times as before, the final resulting liquid will contain 15.873 per cent. of sugar, or almost its original concentration. These results, however, are not always to be obtained completely in practice.

The process of maceration now chiefly employed on a large scale is that introduced by Schuetzenback, and consists in placing the beet pulp in vats provided with an agitator, to keep it constantly in motion. The vats have a false perforated bottom, for the complete removal of the liquid, and a corresponding perforated top, the holes of which serve as distributors of the exhausting medium. Twelve tubs form a battery, and the transmission of exhausting liquor between the different exhausters is effected by means of a rotary pump. The motion of the agitator should be about twenty-two turns a minute, neither fast enough to make much froth, nor so slow that the pulp will float. This process furnishes eighty-nine per cent. of beet juice.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

HYDRAULIC CLOTHES BOILER.—M. W. Staples, Catskill, N. Y.—This invention relates to the manner in which a circulation of water through a clothes boiler is produced in the process of washing clothes.

MARKING ROLLER.—L. R. Witherell, Galesburgh, Ill.—The object of this invention is to provide a simple and expeditious method by which the trade brand of merchants, dealers and manufacturers may be affixed to their goods and wares and boxes, barrels, and packages may be accurately and expeditiously marked without the use of the marking brush or stencil plate as now used.

CORN PLANTER.—John N. Arvin, and Joseph M. Whitmore, Valparaiso, Ind.—This invention relates to an improvement on the arrangement of a machine for planting or dropping Indian corn automatically in regular checks without furrowing.

NURSERY PLANTER.—J. Warren Clark, Iowa City, Iowa.—This invention relates to the planting of hedges or any small plants in rows, as practised by nursery men or horticulturists. It consists in providing a box wagon made tight to hold water mixed with earthy matters or compost, forming such a puddling compound as is usually applied to young plants and trees when set out to insure their vitality and growth, having connected with it an apparatus for running a narrow furrow or trench in the earth and conducting the fertilizing compound directly into said trench behind the plow or coulter employed for opening it.

HAMMER.—J. Yerkes, Fox Chase, Pa.—This invention consists of a cast iron hammer with claws which are produced by splitting or sawing in such a manner that the edges of said claws are rendered sharp and capable of taking a firm hold of nails or other articles.

CULTIVATOR.—W. J. Oxer, Williamsport, Ind.—This invention consists in the combination of peculiarly shaped iron bars to form the frame of the cultivator as herein after more fully described.

EVAPORATOR.—H. C. Gilbert, Cambridge, Vt.—This invention has for its object to furnish an improved means by which the evaporating or drying pan may be removed wholly or partially from over the fire.

NURSING COUCH.—James H. Cogshall, Lexington, Mich.—This invention has for its object to assist the mother in nursing her child by compelling her to sit upright, and at the same time giving that support to the muscles of the arm which she required.

GATE LATCH.—W. T. Wells, Decatur, Ill.—This invention has for its object to furnish an improved adjustable gate latch constructed without springs and so arranged that the bolt will be thrown quickly into the catch, that it cannot be opened by cows or other cattle, that it may be readily adjusted to accommodate the position of a shrunken or sagged gate or post, that it will not be liable to get out of order, and that it will be easily attached to the gate.

BELT LAP CUTTER.—Charles E. Robinson, Concord, N. H.—This invention consists in attaching the knife to a grooved sliding block working in grooves in the top leaf or upper part and provided with a handle of the machine in the combination of a rubber or other elastic seat with the lower leaf or part of the machine, and in hinging the lower and upper leaves or parts to each other.

HYDRAULIC PUNCH.—Joshua B. Barnes, Fort Wayne, Ind.—This invention has for its object to furnish an improved punch by means of which more work, with less power, and in a less time can be performed than can be done with the ordinary punch; and which can be used upon a boiler, inside or outside wherever it can be got upon a flange.

WHEAT DRILL.—Jacob Slauder, Osborn, Ohio.—This invention relates to an improved machine for sowing wheat and other small grain or seed in drills, and consists in arranging positive gearing in connection with the driving wheels of a truck and an endless screw for feeding the wheat or other grain with certainty and regularity in just the desired quantity from a hopper.

MACHINE FOR BENDING SKELP FOR TUBING.—John Peace, Camden N. J.—This invention relates to the manufacture of metal pipes or fine tubes, and consists in an arrangement of dies for clamping and bending the skelp or iron plate into shape preparatory to welding the edges or laps so formed for making the tubes or fines.

HORSE POWER.—Theophilus Harrison, Belleville, Ill.—This invention is designed to obviate the great loss of power caused by friction, in transmitting the power of the horse or horses to the machinery to be driven. In the single pinion horse powers a great deal of friction is produced by the pressure of the master wheel on its pin or axis; and in the double pinion powers, as well as others designed to obviate the friction above specified, the arrangement of the gearing together with its complexity, produces as much friction as is saved by the relieving of the pressure of the master wheel on its pin or axis.

WASHING MACHINE.—J. S. Gochnauer, Goshen, Ind.—This invention relates to a washing machine which is composed of a yielding bed of conical rollers in combination with a corresponding conical roller rubber consisting of two wings which are hinged together and to which a revolving motion can be imparted by a vertical shaft which catches over the rod that unites the hinges of the two wings.

MODE OF TREATING INDIA-RUBBER.—Stephen Bourne, Headstone, Drive Harrow, England.—The object of this invention is to deprive india-rubber and the goods or articles into the composition of which it enters of the odor attaching to india-rubber itself and the various solvents or other substance or substances with which it is combined. And for this purpose, the invention consists in exposing the india-rubber or its various compounds to contact with charcoal and heating them together to such an extent as the different descriptions of goods may bear without injury; charcoal especially animal, having the power of absorbing the offensive smell or odor usually pertaining to this material as well also as its ability to impart flavor to liquids and other substances with which it may come in contact.

WHEELS FOR VEHICLES.—Jacob F. Morris, Lansingburgh, N. Y.—This invention has for its object to furnish an improved means for oiling the axles of vehicles, by the use of which the vehicle may be run for weeks with one application of oil, and kept at all times properly lubricated without the waste of oil.

COVERING OF HOOP SKIRT SPRINGS.—William S. Ryerson, Philadelphia, Pa.—This invention has for its object to protect the covering of the hoops or springs, and preserve them from becoming worn, and thus promote the durability of the skirt.

SMUT MACHINE.—William E. Tickler, Ezra T. Marshall, and Daniel M. Marshall, Fierceton, Ind.—This invention relates to improvements in smut machines, whereby the work of cleaning grain is executed in an efficacious and rapid manner.

DUST AND DIRT RECEPTACLE.—Chesmon Butterfield, West Waterville, Me.—This invention relates to a dirt receptacle to be used in the floor of a room, which receptacle is provided with a cover or slide, in connection with a bottom, so arranged and connected together that when the one is opened the other may be closed.

BOILER FURNACE.—Thomas H. Clark, Indianapolis, Ind.—This invention consists in causing the products of combustion to be equally distributed under the boilers set in a furnace for the purpose of generating steam, and in preventing them, when several boilers are set in an arch, from passing away diagonally from those boilers which are most remote from the chimneys.

CONSTRUCTION OF PAPIER MACHE FOR CASTING STEREOTYPE PLATES.—William Nelson, Boston, Mass.—The invention relates to the construction of papier mache matrices for casting stereotype plates, whereby a superior matrix is obtained for the purpose.

WAGON JACK.—Charles T. Close, Brooklyn, N. Y.—The wagon jack embraced in this invention consists of two legs pivoted together at one end, with a cam lever handle pivoted to the lower end of one leg, so that if the jack, by one leg, be properly placed under the wagon axle, by swinging the handle up the axle will be lifted.

TENT BEDSTEAD.—Rev. A. D. McCoy, New Orleans, La.—This invention consists principally in the combination with a camp bedstead of an upright framing for the reception of a canvas covering, this framing being so put together as to be readily set up and taken down.

FLOATING ANCHOR FOR KEEPING A VESSEL'S HEAD TO THE WIND.—George L. Baker, Astoria, N. Y.—This invention has for its object to furnish an improved apparatus, by means of which a vessel that has lost her rudder or become otherwise disabled or unmanageable in a gale of wind, may be held with her head to the wind, and thus prevented from getting into the trough of the sea and foundering.

BEE HIVE.—C. P. Lloyd, Portsmouth, Ohio.—This invention relates to a bee hive of that class which are provided with removable boxes, and it consists in having the sides of said boxes of glass, and each box provided with a slide and a series of movable comb frames, whereby any one of the boxes may be removed from the hive and the condition of the bees examined without any risk of being stung or without killing or injuring the bees.

BEE HIVE.—Charles McGrew, Bloomington, Ill.—This invention consists of a bee hive, constructed in such a manner and provided with vessels for the reception of water or other liquids, located in such a position that the bee moth will be entrapped and the bees protected from the ravages of that insect.

SHAFT COUPLING.—H. K. Smith, Norwich, Conn.—With this coupling shafts can be readily secured together or detached, and, when coubled or fastened perfectly centered.

CULTIVATOR.—Edwin Children, Lancaster, Wis.—This invention relates to a cultivator of that class which have their plows connected to a frame mounted on wheels and provided with a pivoted draft pole. It consists in a novel means for raising the plow beams and retaining them in an elevated position; and also in an improved arrangement of the draft pole and means of attaching the plows to their standards, whereby advantages are obtained.

PIPE TONGS AND CUTTER.—John Peace, Camden, N. J.—This invention consists principally in combining with one jaw of the tongs a double ended adjustable steel socket having a series of air spring edges; also in combining with the steel socket a bridle of suitable shape to fit about the tongs, to adapt them for the cutting off of pipes.

MANUFACTURE OF CAST STEEL.—V. Gallet.—Dated June 14, 1866.—The inventor of this process takes iron, by preference such as has been submitted to one rolling operation only in which state it is termed "puddle bar," and coats it with a paste made by mixing water with the following ingredients: Limestone, 30 parts; vegetable mold, 3 parts; carbonate of potass, 3 parts; oxide of manganese, 6 parts; resin, 6 parts; soot, 10 parts; charcoal, 34 parts; common salt, 3 parts. The iron coated with this composition is melted in a crucible, and cast steel is in this way obtained from iron in one operation.

METHOD OF TREATING PERMANENT INFLAMMABLE GASES, WHEREBY GREATER HEAT IS OBTAINED THEREFROM.—B. F. Stevens.—Dated June 15, 1866.—This invention consists, essentially, in mixing steam with gas obtained from the distillation of wood, resin, petroleum, peat, and other hydrocarbon substances in the manner hereinafter described, and employing this mixture for the production of heat.

MANUFACTURE OF PIGMENTS.—J. E. T. Woods.—Dated June 13, 1866.—The patentee proposes to utilize the condensed or deposited fumes of lead from lead furnaces, such deposit being known as lead soot or sublimated lead, by converting the same into a chloride of lead. One method of effecting this object is to treat the sublimated lead or lead soot with heated muriatic acid, or to treat the lead soot in combination with a saline chloride, such as the chloride of sodium or common salt, whereby the chlorine having a greater affinity for the metallic than the earthy base, will form a chloride of lead, which, being dissolved in water, and the lead precipitated therefrom, will leave a white pigment suitable for various useful purposes to which pigments are applied.

TREATMENT OF ANIMAL CHARCOAL USED BY SUGAR REFINERS OR OTHERS, IN ORDER TO ITS RE-USE.—W. B. Patrick.—Dated June 18, 1866.—In carrying out the improvements the charcoal, while still in the filter, after it has lost its power by use, is first washed, by causing hot water to flow through it. It is then dried, or partially so, by causing hot air to pass through or among it, aided by force or exhaustion. It is then allowed to remain for fermentation in the filtering vessel, with the taps or valves opened to the atmosphere for twenty-four hours or more. When fermentation has taken place carbonic acid gas is admitted to act on the charcoal for the purpose of rendering soluble or neutralizing the lime or alkaline matters which have combined or mixed with the charcoal in its use. Hot water is again passed through the charcoal, to cleanse it of matters rendered soluble by the action of the gas.

STAIR ROD.—W. B. Gould, New York City.—In this invention the stair rod at each end is held in a socket secured to the stairs at the proper points, and provided with an adjustable yielding bearing surface for the end of the stair rod, whereby the rod, without disturbing or detaching the sockets, can be placed within or removed from them with ease and facility.

SCISSORS SHARPENER.—A. W. Gifford, Worcester, Mass.—With this sharpener the blades of scissors can be sharpened with ease and dispatch and without injury.

PROCESS OF UTILIZING WASTE VULCANIZED INDIA-RUBBER, AND MANUFACTURING HARD RUBBER THEREFROM.—G. T. Bousfield.—Dated June 19, 1866.—The first part of this invention has for its object to avoid the expensive and dangerous modes of treatment usually adopted, and to restore to the rubber those properties of which it has been deprived by the process of vulcanization to which it had been previously subjected. This the patentee accomplishes by adding to the rubber (after it has been suitably comminuted) a portion of some vegetable oil, which having no solvent action on the rubber, simply restores to it those properties and that capability of being vulcanized which it possessed in the crude state.

APPLICATION OF ELECTRIC LIGHT FOR GIVING EVIDENCE OF BUOYS OF EVERY DESCRIPTION.—A. Mirounde.—Dated June 20, 1866.—This invention consists in the employment of the electric light for lighting buoys without requiring any communication from the shore, by which they can be increased in number and placed as far from the land as the sea or river navigation requires, the object being to light buoys by means of the light produced by electricity in the apparatus known as Geissler's tube, and is carried out by placing in the buoy to be lighted, whatever may be its dimensions and form, a receiver or battery (of a size and weight in proportion to the size of the buoy), producing an electric current; then a Rahmkorff induction bobbin; and lastly, at its upper part, the lamp is furnished with several glass tubes or spheres, known as Geissler's tubes.

COTTON BALE TIE.—Joseph Knight, Louisville, Ky.—This invention relates to a new and improved device for fastening iron hoops or straps upon cotton and other similiar bales, and consists in a flat loop of plate iron made square at one end and diagonal at the other, through which the ends of the strap are passed, and the outside end is bent in a peculiar way on the diagonal side of the loop and secured by slipping it under the body of the hoop above the loop.

DRESS HOOK.—Andrew Bennett, Brooklyn, N. Y.—This invention relates to such a construction of a dress hook that the same cannot be spontaneously disengaged from the eye, while it does not require much more than the usual force to unhook the same, if required. The invention consists in the use of a spring, which is formed by an extension of the wire of which the hook is made, whereby the aforesaid results may be obtained.

ROCK DRILL.—G. F. Case, New York City.—This invention relates to that class of drills in which diamonds are employed as the medium for cutting the rock, and it consists in arranging the diamonds in the head of the drill in two or more rows, and also in so setting them as to cut the entire surface of the rock embraced by the drill head.

SODA-WATER STAND.—Abraham Van Winkle, Newark, N. J.—This invention relates to a soda-water stand which is composed of two or more tiers of sirup cans placed one above the other, instead of one row on each side of the stand, as heretofore constructed, in such a manner that the appearance of the stand and its convenience are enhanced, all the ornamental sirup drafts being shown at a glance and in convenient reach of the person having charge of the stand. The draft for drawing the soda water is placed at the end of the stand, and thereby the soiling of the plated sirup drafts by the spattering of sirup and water is avoided.

MUCILAGINOUS COMPOUND.—Victor Bloede, Brooklyn, N. Y.—This invention relates to a mucilaginous compound obtained by treating common wheat starch with a mixture of acids applied in such a manner and proportion that a perfectly white gum can be produced, fit for photographers and for other delicate work, or gums of a more or less dark hue, according to the work for which the gum is to be used.

FISH HOOK.—Benj. Lee, Jr., Williamsburgh, N. Y.—This invention consists in combining a spring with the stem of a fish hook, the object being to increase the strength of the hook without materially increasing its weight, as well also as to render it sufficiently flexible to resist sudden strains.

BURGLAR AND FIRE ALARM.—Josiah Holmes and Charles W. Nickerson Pittsburgh, Pa.—This invention relates to the construction of burglar and fire alarms, and consists in the arrangement of devices in connection with inflammable guard cords stretched throughout a building, whereby, when the guard cords are burned by fire or broken by the entrance of a burglar through a door or window, an alarm bell is started which will awaken and notify a person in charge of the building.

STEAM GAGE.—William Stamp, Susquehanna Depot, Pa.—This invention relates to the construction of gages for indicating the pressure of steam in boilers, and consists of a novel form and arrangement of a steel diaphragm or partition plate upon which the steam acts by expansion, and also the means of adjusting the moving apparatus of the dial to indicate the degree of pressure with minute accuracy.

WHITENING CURRIERS' SLICKER.—Daniel Peters, Keokuk, Iowa.—This invention has for its object to improve the construction of Daniel Peters and W. D. Wilson's slicker, patented April 19, 1864, and numbered 42,907.

The claims of the following notices were patented Feb. 5, 1867:—

MACHINE FOR HEADING BOLTS.—Philip P. Trayser, Baltimore, Md.—In this machine the heading tool is free to rotate upon its axis so that as the square head of the tool moves forward within the die it is adapted to turn or adjust itself sufficiently to become coincident with the inner surfaces of the die and thereby prevent the abrasion or cutting action by the tool, which occurs in machines of this class as heretofore constructed,

MODE OF FASTENING ROOFING.—J. C. Wands, Nashville, Tenn.—The material consists of a layer of wire cloth covered with any pitchy substance on the outside and with a coat on the inside to prevent its adherence to the sheathing of the roof. The breadths of fabric, felt or prepared paper are laid parallel upon the roof from ridge to eave, their edges lapping each other upon raised strips which are capped with metallic plates which fasten the lapped edges on the strips making a water-tight joint.

COTTON CULTIVATOR.—James C. Bethea, Blakely, Ga.—The sheath or standard is made of the same shape toward the front end to the rear to either of which the share may be attached so as to adapt it to throw the furrow to the right or to the left; the beam itself being shifted end for end to adapt it to the change.

COTTON-BALE TIE.—Henry Fassmann, New Orleans, La.—The buckle of this tie has two loops for securing the ends of the hoop and a ridge or ridges on one or both sides to press the hoop against the cotton and prevent its withdrawal. In use one of the hoops is first lapped around the bar of one loop and the other end of the bar is inserted through the notch in the bar and lapped over the bar of the loop whose notch it spans; the chamfered corners of the bar at the notch permit the oblique insertion of the hoop therein.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Wanted.—Best wool carding and spinning machines and power looms. Manufacturers send circular and price list to C. Picard & Co., Nebraska City, Nebraska Territory.

B. G. Stockton, of Flint, Mich., asks where he can purchase a roadometer and the price.

H. E. Shipman, Towanda, Pa. Where and at what cost can I obtain a machine for making shoe pegs? What power does it require?

Newton Clark, of Baraboo, Wis., asks where machines can be procured for sharpening hop poles.

Forgings of all kinds promptly executed to order at the New York Agricultural Manufactory, corner of Jay and Plymouth streets, Brooklyn.

Chattanooga Water Works Company, Chattanooga, Tenn., want a pump that will supply 500,000 gallons of water per day at an elevation of 150 feet.

Winter & Ball, Honesdale, Pa., wish to communicate with manufacturers of Gates Automatic Turning Lathe or any other wood turning machinery manufacturer. Also of water wheels and saw mills.

Pumps, brass and iron, all sizes. Send for list and prices. Rumsey & Co., Seneca Falls, N. Y.

Parties having for sale second-hand machinery for manufacturing flour barrels will address Wm. Ruddick, Keokuk, Iowa.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

M. C., of Conn., sends us the details of a supposed spontaneous explosion of a burning oil which he had purchased under the name of "Non-explosive Union Oil." His wife was filling lamps from a can, in the day time standing about six feet away from a coal fire burning in a stove. On removing the stopper which was a piece of potato the oil (vapor) in the can exploded and set fire to the lamp, etc. A previous stopper, a wad of newspaper, had fallen into the oil; except in this respect the oil was clean and in as good condition as when procured. M. C. is unable to find any cause of the explosion. We are unacquainted with the oil under the name given. If M. C. on re-examination of the case is still satisfied that the explosion did not originate from the fire in the stove or any other fire burning in the room, we recommend him to have examination of the oil and can made by a competent chemist. We have placed his letter on file for future reference if necessary.

D. U. S., of D. C., supposes a very long railway car going East. A track is laid on the top of the long car, and on this track is a short car going West at the same rate as the long car goes East. What is the motion of the short car in relation to a spectator at rest on the side of the railway. What the motion after the short car falls down on to the main track. A very good case for the juveniles.

J. V., of Ala.—The enamel on watch faces is a white glass or glazing which is melted on the metal in a muffle. Photographs may be made on any genuine enamel.

O. H. H., of N. J., sends the following interesting computations. A cubic mile of water in round numbers is equal to 147,000,000,000 cubic feet or 9,000,000,000,000 lbs. or 4,500,000,000 tons."

J. C. A., of Conn., sinks a pipe perpendicularly into the earth 90 feet, and water is found at 25 feet. He appears to enquire if the water will not rise to the surface of the ground, by reason of the great length of the pipe. The length of pipe beyond the point where its end would constantly be in the water would be of no advantage.

J. C. M., of Me., sends a pencil sketch of a singular freak in the formation of ice. A common wooden pail had been left out of doors till a film of ice had formed about a quarter of an inch in thickness. The surface was ordinarily even except that two or three inches from one side rose a neatly formed flattened tube of ice. The tube was one and three-eighths inches high, one and one quarter inches in outside diameter, about quarter of an inch internal diameter.

W. S., of O.—Benjamin Pike, Optician No. 518 Broadway can supply you with microscopic photographs.

A. H., of N. Y.—The process for purifying black lead consists in mixing it with sulphuric acid to a pasty consistency and exposing to heat till a considerable part of the acid is decomposed. The mass is then washed with water which dissolves the impurities.

J. M., of Pa., thinks it extraordinary that there was a thunder storm in his town (Bareville) on the 23 inst. But we had also here on the same day a thunder storm and another on the 9th. Such storms in winter are rare. They are to be explained in the same way as the summer storms.

H. W. S., of O., suggests that the law of equal pressures in all directions should be extended to solids as well as liquids. He argues that the difference between liquids and solids is only in degree that all liquids have some cohesion, and no solid is perfectly rigid; and concludes that the law of equal pressures is applicable to all bodies due allowance being made for the action of cohesion in individual cases.

R. B., of Ill.—The so-called marine soap, or the soap which can be used with salt water, is made of cocoanut oil and soda. Vegetable oils generally make soaps which are more soluble than those containing only animal fats. Palm oil is used in all parts of the world as a soap fat.

W. R., of N. Y.—We cannot see any greater difficulty in extinguishing a fire in the basements of buildings on the line of the proposed arcade railway, than in the lower stories of other buildings; in fact not so much. The areas leading to the tunnel, and the building, itself, would suffice for the escape of the smoke. It would not be necessary for the engines to be placed on the lower level, but they could be worked from the street, as at present.

J. F. D., of ——, has some old brass bearings, faucets, etc., which when melted will not fill the molds well and is too hard to work easily. He desires to know how to remedy it. We think the addition of a little zinc, say 20 per cent, would improve it. Plumbago crucibles are not injured by long exposure to a low fire. It is high heat that weakens them.

B. of R. N., Wis.—You are quite correct. Arsenic is recognized as a medicine and is used by most of the faculty under the form of what is called Fowler's solution. There are perhaps no well known poisons which have not been praised for their medicinal virtues. If you make up your mind to take no doses which contain a poison you may as well at once dismiss all the doctors. The root doctors and the Indian doctors, in respect to the poisons are just as bad as their more enlightened brethren

R. N. T., of Me.—There is as yet no successful electro-magnetic engine, and our knowledge must be much farther advanced to enable us to see how it is possible that electricity can supercede steam as a motive force. The electrical force equivalent to steam force costs about fifty times more, and in utilizing it for mechanical work there is a larger per centage of leakage.

R. B., of Vt.—The steam gun was invented by Jacob Perkins an American, who exhibited it in London where for a time it was the great sensation.

S. C. N., of Del.—Your opinion is just as good as ours, perhaps better on the probable advent of cholera this year. We do not entertain many subjects where mathematics and physical demonstrations are wholly inapplicable.

S. G., of Tenn.—The sources of zinc are very abundant in the United States, but very little of the American metallic zinc gets into market. It is found more profitable to use the ore for zinc paint.

N. L. N., of N. J.—There is no way known of bleaching printing ink. The black matter of the ink is carbon for which there is no so vent. Any corrosive substance which can destroy carbon, acts much more powerfully on paper and other organic matter. Writing ink is of a different nature altogether and its chlorine may be discharged by chlorine and almost any acid; oxalic acid is most commonly used.

R. B., of R. I.—The acid of the lime, lemon and orange is the same substance, citric acid. The acid cannot be manufactured profitably in your state.

S. N. D., of Ind.—We hear complaints from all quarters about the vinegar. It appears as if half of the manufacturers do not understand their business. A great deal of the vinegar now sold loses all its sourness in a few weeks and becomes offensive to the smell. We are told also that some of the vinegar makers have learned the art of increasing the sourness by putting in sulphuric acid. Those who are anxious on the subject should test the vinegar by a solution of chloride of barium; a white precipitate indicates sulphuric acid.

J. F. S., of Kansas.—To determine the efficiency of a water ram it is necessary to know the diameters of the pipe as well as their lengths. You will perceive therefore that your question cannot be answered.

Improved Tile Roofing.

In some districts of this country, as well as in some other countries, wood is scarce and cannot be obtained readily, even for the purposes of roofing. Shingled roofs may be considered essentially American, not being much in use elsewhere. Slate stone is not universally found, and metal roofing corrodes readily in some climates. In such cases recourse must be had either to tiles or some more primitive material.

The annexed engraving shows a method of forming and laying tiles to make a convenient roofing. It is the invention of gentlemen living in Colorado, where wood, slate and metal for roofing purposes are scarce. The tiles are made in sections, so formed that each successive layer is a support to that next preceding. The tiles are made with projections running across the under sides to rest against the eaves or wall plate and against the cross rafters. The upper edges also have projections at the other ends of the tiles to lock into the downward projecting edges before mentioned. The whole is secured in place by a strip which near the ridge-pole fits into proper depressions, and the longitudinal recesses in the center of the tiles form in combination perfect gutters for rain. The arrangement can be easily understood by the engraving. It would seem to be admirably adapted for certain situations. Address Chas. Bamberg or Jos. Weiber, Box 443 Central City, Colorado, for state and county rights.

BAMBERG & WEIBER'S TILE ROOFING.

Absorption of Gases by Solids.

Among the interesting observations of Mr. Graham, Master of the British Mint, (to some of which we have lately referred) upon the passage of liquids and gases through solids, is the fact that atmospheric air, by passing through india-rubber, becomes super-oxygenated, and will rekindle smoldering wood like pure oxygen. Any kind of light india-rubber receiver, in which a vacuum may be obtained, the size being sustained by mechanical means, will collect super-oxygenated air; the better if the india-rubber be thin and the temperature high. Mr. Graham makes the suggestion that the solid films pass gases through them by first condensing them to a liquid form within the substance, and then passing them off on the other side by evaporation. Hydrogen passes through redhot platinum, while oxygen and nitrogen do not, or not in appreciable quantities; hence their compounds with hydrogen are readily dialysed by this method. The passage of carbonic acid, chlorine, hydrochloric acid, vapor of water, ammonia, coal gas, and hydro-sulphuric acid, is also inappreciable, while the hydrogen, in compounds containing it, passes. One volume of redhot platinum absorbed 0·207 volume of hydrogen, retained it while cold, and gave it off on reheating. One volume of palladium absorbed 643 volumes of hydrogen, sensibly increasing its weight, and when heated afterward, gave off the most of it in a continuous stream. On the other hand, osmium-iridium does not absorb hydrogen, and copper absorbs it very slightly. Gold absorbs hydrogen and nitrogen slightly. Silver absorbs 0·289 of its volume of hydrogen, and then presents a beautifully frosted appearance. Oxygen is taken up in the proportion of 0·745. Redhot iron and steel pass hydrogen as readily as platinum does.

WILSON'S CLASP HOLD-BACK IRON.

In attaching the common hold-back irons to carriage shafts the shaft itself is weakened by the insertion of screws which remove a portion of the wood from that part that requires to be as strong as any other, if not stronger. In case of accidents by the stumble of the horse, the shaft is frequently broken, even if the animal does not fall upon it. The hold-back here represented is not open to these objections, as instead of weakening the thill it really strengthens it. It is made of malleable iron in one piece, embracing the shaft by two bands, A, which unite on the hook-front plate. On the opposite side the hold-fast is divided in a line with the shaft and the two parts are secured together by a single screw, head seen at B, which gripes the halves firmly around the shaft. By loosening this screw and drawing that at C the hold-fast can be removed to any portion of the shaft desired. The projection, D, on the inside of the hook makes it almost impossible for the breeching to slip out.

The contrivance has a very neat appearance and seems to be calculated for giving additional strength to the shaft. It was patented Nov. 6th, 1866. Information required by those interested, as to rights to make and use, can be obtained from Edward Wilson, Northbridge, Mass.

THE MODEL SCHOOLHOUSE.—The Legislature of Massachusetts has decided not to pay for the model schoolhouse which certain gentlemen have been getting up for the Paris Exposition. The point is, that Massachusetts and other American States excel not particularly in school *houses* but in school *laws*. Such a humble specimen of mere architecture, in the Exposition, will astonish the natives only as flies in amber do—how in the name of common sense, did they come to be *there*.

DAVIS'S IMPROVED PROPELLER SCREW.

The inventor claims for the screw represented in the accompanying engravings several advantages over that in common use. As may be seen in the engravings, it is a combination screw, formed in parts and put together, instead of being a single casting. The blades are made of boiler plate, or of plate steel, of equal thickness throughout. They are cut from a flat plate, the holes for the reception of the propeller shaft made, and then either by hammer, rolls or formers curved to the proper shape. Each blade is precisely alike, so that if one should be broken a duplicate could be readily fitted.

A is a collar secured upon the shaft, and the inner legs of the blades bear firmly against it. The sleeve, B, keeps the legs of the blades at the proper distance apart, and the collar, C, and nut secures all in place. To hold the blades in position against the leverage of the water, bolts may be passed through the collars and blades longitudinally with the shaft, or the blades may be held by a feather on the shaft.

Fig. 1.

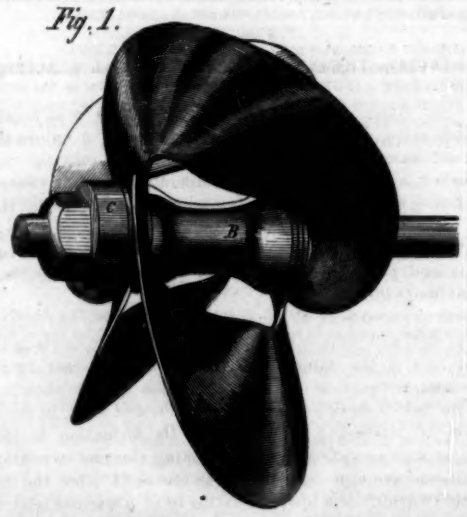


Fig. 2.

Among the advantages claimed for this screw over others is increased strength from the material used, less weight, greater efficiency from the uniform thickness of the blades, facility for repairs and also for transportation as shown in Fig. 2. When a blade is broken from a cast propeller the screw is ruined, and floating ice, timber, or fouling by a rope, are always threatening such an accident. With this screw, however, the breaking of a blade can be at once remedied by removing the remaining portion and replacing it with a duplicate blade. Letters patent for this device were granted through the Scientific American Patent Agency to William E. Davis, Aug. 7th, 1866. Mr. Davis will supply all further information if addressed at Jersey City Locomotive works Jersey City, N. Y.

Steam Plowing.

A steam missionary has been sent over from Englan to preach to our Western farmers. The economy of steam plowing, cultivating, and harvesting in the Mississippi valley, is extraordinary, of course. The cost of the apparatus is the grand objection. In England, where $5,000 will buy a plowing equipment, it is found that few farmers feel able to furnish themselves, and still fewer, perhaps, could give enough employment to the capital in this form to render it remunerative. Hence association is resorted to, and a neighborhood of farmers sometimes organize a company for steam cultivation. Under our free laws of association this can be done with facility and advantage. Messrs. John Fowler & Co., of England, have taken the right way to extend their business, by sending out the agent above referred to, with their apparatus, (price $10,000) to exhibit its economy and induce the Western farmers to form associations for owning and operating it. An objection to doing this business by itinerant jobbing, is the cost of so much heavy transportation. The work of the steam plowing apparatus is estimated at an acre per hour, twelve inches deep.

Aerial Ferry.

We are rather surprised that our aëronautical friends have not seized the present favorable juncture for proposing an "air line" from New York to Brooklyn. It would seem that the first practical success in aerial navigation should be on short crossings like these, where some kind of guide or aerial suspension way can be established, along which to propel and steady in its course the unfledged flying ship. A sort of guy rope anchored to a pier in the middle of the channel, reaching to the shore, and there connected to the aerial boat, would guide it over in a parabola; yielding gracefully to any lateral deflection the wind might require in either direction. On approaching the shore, a gradual and easy descent would be secured by running out the guy rope off a drum checked by the tension of a strong spring or brake, thus rendering the centripetal pull sufficiently elastic. An experiment might perhaps be cheaply conducted by using one of the islands up the East River.

PAYMENT OF A PATENTEE.—Senator Van Winkle, from the Committee on Post Offices and Post Roads, reported a bill authorizing the Post Master General to pay $100,000 to the owner or owners of the letters patent granted to Marcus P. Norton, of Troy, N. Y., for invention for marking of letters, etc., and for the cancellation of postage stamps thereon, said sum to be compensation for the past and future use of the patent, and for which the transfer of the same is to be made to the United States.

Our readers will find an illustration of this invention on page 104, Vol. XI., SCIENTIFIC AMERICAN.

RAILWAY DRY DOCK.—Two gentlemen of Portland, Me., have patented apparatus designed for connecting with a dry dock a system of tramways and trucks upon which a ship, after being docked by means of high tide and supplementary water raised by pumps, may be run out into a ship yard adjoining, making room for others to any required extent. Locks and reservoirs are also arranged in such a manner as to store at the required elevation, for further use, the water once raised for the purpose of docking a ship.

GEORGE PEABODY'S GIFT.—A million of dollars in cash, and a million and more of unrepudiated Mississippi bonds which can be fully resuscitated through a shrewd application of the terms of the gift, make up a virtual donation of probably two millions of dollars, given in trust to a number of our most patriotic and liberal public men, for the all-important object of the time—the education of the youth of the Southern States, without any other distinction than that of their needs.

OFFICERS OF THE AMERICAN INSTITUTE.—The election of officers of the American Institute took place on the 14th inst., when the following gentlemen were elected:—President, Horace Greeley; Vice Presidents, Dudley S. Gregory, Orlando B. Potter, William H. Vanderbilt; Recording Secretary, Salem H. Wales; Corresponding Secretary, Samuel D. Tillman; Treasurer, Sylvester R. Comstock.

PATENT EXTENSION.—Senator Willey, Chairman of the Committee on Patents, has made an adverse report on the application of Geo. B. Simpson for the extension of a patent of a telegraph-cable insulation by gutta percha. The case was elaborately argued by several prominent lawyers.

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VOL. XVI., No. 9....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, MARCH 2, 1867.

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We have a very large number of valuable communications from correspondents who have acted upon our suggestion to write upon practical subjects for our columns. We shall publish them as rapidly as possible. In this connection we wish again to thank our readers for the great interest which they have taken in promoting the circulation of our paper. The subscriptions are still coming in very rapidly and we are now printing 35,000 copies per week.

THE SOUTH AMERICAN MEDITERRANEAN.

Professor Agassiz, in his second lecture (Feb. 11) forgot or deferred the sequel of the interesting geological history of the continent, and devoted the evening to the history of his expedition and the present terraqueous topography of the valley; with both of which our readers are already somewhat acquainted. Certain points, however, struck us with a significance not brought out in former reports, and we shall therefore take occasion to review the ground in a few words.

The valley of the Amazon is no valley to the eye: its bounds are far too distant to be visible at any point in more than one direction if at all, and its slopes are altogether inappreciable by the senses. Even the current of its waters is imperceptible, and sometimes locally reversed; so that it presents to the voyager no other appearance than that of an inland sea with a long, low, distant shore. On either side, the tributaries have a similar appearance: they are themselves so enormous that the eye cannot span their breadth: for example, there are four rivers descending from the Guianas on the north, east of the Rio Negro, hardly noticed on our common maps by name, yet of a wonderful size, one of them being no less than thirty miles wide at the mouth. Not to speak of the "great" affluents, the Xingu presents at its junction with the main river a front of forty miles broad, and the Tocantins, of sixty; and of all of them, it must be remembered that you ascend from the junction from a hundred and fifty to hundreds of miles before any appearance of rising ground, rocks or minerals can be found. The front of the united rivers, with their nearly oceanic depth, at *one* of the final outlets, is 150 miles across, and its yellowish white hue (like coffee and milk) tinges the ocean far out of sight of land.

Nor is the Amazon, when you have imagined its to the eye shoreless breadth, to be conceived as a simple stream or belt of water. It is a water system, prevading the country with unnumbered channels and branches for hundreds of miles in breadth. Independently of the usual obstructions and partings of streams, this system has a structure peculiar to itself, resulting from remarkable causes. The swelling of the waters will amount to from thirty to fifty feet, every rainy season, and the remarkable fact is that this takes place from two opposite quarters, the north and the south, not at the same time, but alternately.

The snows of the Andes melt in August and September, and reach the Amazon by October or November. The rains also begin on the south side in September, and the swelling of the southern tributaries pours into the great bed about the last of November. Both inundations continue with increasing volume until March, when the entire sea rises sometimes at the rate of a foot in twenty-four hours. At the same time, the tributary rivers from the north are at their lowest stage; and bearing in mind the fact that the fall of their channels for a long distance hardly exceeds that of the Amazon, or ten feet in a hundred miles, it is evident that a rise of thirty to fifty feet in the main river must not only send a vast back water up the northern tributaries for hundreds of miles, but must follow the depressions of the ground in every direction, and create a network of innumerable water courses.

At the hight of the southern freshet in March, the rains begin on the north. As the southern rivers subside, the northern rivers swell, and come down in full flood about June, to gorge in turn the channels of their southern rivals, and to press the swollen tide up the southern side of its basin in the summer, as it rose upon the northern side in winter. Thus the water system we are describing resembles an ocean not only in extent and evenness of surface, but also in its (semi-annual) tides.

The result is that all the roads in this wonderful country are ready made. They are water roads, or ship canals, on the grandest scale of nature, through which the united navies of the world might steam or sail in company, for 2,000 miles from east to west and 500 miles on each side, or 1,000 miles from north to south; freely penetrating every portion of the country through the profusion of cross courses by which the rivers, swollen on both sides as we have seen, twice a year, have overflowed and run into each other, and in short have divided up the whole land into islands. Taking this into view with the fact that nearly all the principal countries of South America—Brazil, Peru, Bolivia, Ecuador, New Granada, Venezuela—have their main drainage and the best portion of their domain either in this valley or in navigable connection with it; the importance and the justice of the late decree of the Emperor of Brazil, opening the Mediterranean of South America as a free highway for all nations, are seen at once in a conspicuous light. The Amazon by nature belongs to South America and mankind.

The treasures of commerce to be directly drawn from nature here, have already been brought in a general way to the notice of our readers. We may add to the 300 kinds of choice timber, remarkable for their density and beauty of grain, which cover the entire country with dense forest, an endless variety of strong and light textiles, a variety of fruits of the myrtle family, as numerous and as fine as that of the rose family that embraces all the choice kinds of our northern climate, another family akin to the magnolia, embracing also a great variety of luscious fruits, and still another family of which the character was not defined, quantities of indigenous cotton, probably the greatest on the globe, the material of chocolate, caoutchouc, Brazil nuts, etc., in inexhaustible profusion everywhere, and finally the grand staples, drugs and dyes of the richest character and variety. Settlers would have nothing to do but to gather these stores from gorged nature in a perpetual harvest, and commerce, nothing but to load cargoes of treasure almost directly from the ground on which it grows. The aquatic vegetation is so luxuriant that it is never apparent where the land ends and the water begins, and the latter is often concealed completely by a prairie of rank vegetation and gorgeous flowers.

But there are not now 250,000 people in all this new world; and the bad reputation of the climate, which the learned professor stoutly combats—declaring it, from ten months' trial, most delightful and salubrious—is imputed to the unanimous hue and cry of the officials exiled from time to time to those wild though luxuriant solitudes, whose natural discontent has attributed to them every deadly evil that imagination can conceive. Of the temperature and other interesting matters of this lecture, we need not repeat what we have heretofore republished.

THE GLACIAL THEORY AND THE TROPICAL GLACIERS.

Professor Agassiz' third lecture in New York was a careful elucidation of the Glacial Theory, which he enjoys the honor of having developed and established; proving that a period of a much lower mean temperature than at present must have once existed in the now temperate and torrid portions of the globe, when that peculiar "current" known as the glacial structure crept over the whole surface of the continents, and performed an important part in preparing them for the habitation of man.

The first question is, What is the glacier? We have styled it a current, and such it is, as much as any that exists in the liquid form of the same element, governed in part by the same laws, but performing offices for which water is not adapted. Its law is motion under the influence of heat, in the direction of increasing temperature. Its formation is from snow, at such elevation as under existing thermal conditions permits an average temperature as low as 32°; but the comparative warmth of a lower elevation or of a warmer latitude, usually assists. By this means the snow is alternately softened in part to suspended water, and conglomerated by the freezing of the suspended water, until it forms a granulated ice.

Its law of motion is in substance the simple fact that water expands in freezing. When formed on a mountain side at a proper elevation for the required temperature—and equally when formed on a level, at the right latitude—the glacier is constantly expanding by the expansive congelation of suspended water or rains; and finding little resistance at its lower limit (of altitude or latitude as the case may be) but being more powerfully resisted in the direction of greater cold and rigidity, its horizontal expansion of course pushes in the former direction. In other words, it moves onward, by a simple and constant law, in the direction of warmer temperature; and will continue thus moving as far as that temperature is not warm enough to melt and destroy it entirely.

It is evident that the loose angular rocks constantly crumbled off in the path of the glacier must be carried or rolled along under it, and often embraced and frozen into it, in great numbers. Again, the great transparency of ice to heat, permits the sun's rays to pass through to the rocks beneath and within, and comparatively to warm them. Thus the rocks rolled along under and those carried within the glacier cooperate in thinning by their comparative warmth the ice that separates them, while the grinding movement of the glacier also tends to break it, and thus the rocks practically attract each other, accumulate, and are passed onward until some obstruction arrests them or some cavity receives them. Not to particularize and explain here the very distinct and characteristic arrangement of these accumulations in the Alps, where the active process may be now observed, it will be evident to the reader that some of their peculiarities must be recognizable wherever the glacial drift has passed along, in the disposition of the fragments and in the effect of their tremendous attrition upon themselves and upon the surface of the underlying rock.

The first suggestion of the glacial theory was due to the discovery from the kind of traces above referred to, that the glaciers of the Alps had once pushed out not less than twenty-five miles from their present habitat and extended their flow across the plain of Switzerland until they abutted upon the Jura. The same traces also gave proof that (as might indeed be presumed) they were then some 5,000 feet thicker than now. The inference was imperative, that a glacial temperature then prevailed at the moderate elevation of the plain of Switzerland, and hence must have prevailed in other parts of the world similarly conditioned. This led to examinations everywhere for traces of the glacial drift, and it needs only to be added that they have everywhere been found abundant. In the British Islands, in all parts of North America, and more lately in South America, near the equator,—here commencing on the Andes and moving across the continent eastward, far into the present domain of the ocean—the polished, scratched and furrowed surface of the rock, its grooves always running north and south, (except where the declivity of mountains had changed the direction) and the "drift" of rugged but tamed and abraded fragments, show the unmistakable action of those "mills fo God" once built to grind the face of the earth smooth and pulverize materials for the plastic hand of Nature—now dissolved long since by the breath that built them, having served their end.

LETTER TO MECHANICS AND INVENTORS.

We notice in one of our Michigan exchanges that a stock association is about organizing in Detroit with a capital of $20,000, which is to be employed in defraying expenses of getting up models, obtaining patents, and for establishing agencies for the sale of patents throughout the country. The par value of the stock is fixed at $25, and persons becoming members are required to pay one dollar initiation fee, and a further fee of fifty cents per month, making a total tax of seven dollars which entitles him to a share of stock.

We presume that the parties to this organization are all respectable gentlemen, but it is evident that they are engaged in a business which they do not understand. Efforts have been repeatedly made in this country to organize similar associations and every time the attempt has been made it has failed. Protective or joint stock societies of this kind have also frequently started up in England and though backed by big names, failure has always been the result.

Inventors very naturally and very properly distrust an association that undertakes the double business of procuring and selling patents. The two operations cannot be successfully conducted jointly without causing suspicion. Some inventions will inevitably receive much more attention than others, and it is wholly impracticable to keep a stock of patents on hand for sale like merchandise. The very idea will suggest an absurdity to any practical mind. If the association should chance to get hold of one good invention which promised success they would be quite likely to employ their whole force of salesmen to push it forward in every direction, and thus less important and less easily-managed inventions would have to be suspended.

A member paying seven dollars for his certificate may never have occasion to employ the services of the association. But suppose he does seek their services, what pecuniary advantage does he gain? Nothing more than the facilities possessed by the association and for which of course he must pay extra charges.

We do not object to this scheme as a speculative enterprise, but we do not perceive that it possesses the merit of novelty or is likely to afford any advantage to either mechanic or inventor.

WHEN AND WHERE DOES THE DAY BEGIN?

As we travel eastward the day begins earlier: near the equator starlight appears an hour earlier for each thousand miles going east. When it is sunrise in New York, the people of Europe have had sunlight for many hours, and the Californians are still in their beds dreaming. Evidently the day has a first begining, and at the eastward. But how far and where? What are the people who first see the light of Monday morning?

It is the sun which brings the day; where does he first bring Monday? If we could travel with him we might find out. Let us suppose the case. We will take an early start: at sunrise on Sunday morning, with the sun just at the point of peeping over the horizon behind us, we travel westward. As we go, the people give us a Sunday greeting; we bring Sunday with us to Pittsburgh, St. Louis, Salt Lake, San Francisco. At San Francisco, our faithful chronometer informs us that we have been on the tramp about five hours. But we started on Sunday morning and it is Sunday morning still We go on, still on Sunday morning. Will this Sunday morning ever end? The quiet Pacific knows very little of Sunday or any other day, and our question scarcely receives an echo for reply. When we get to Yokohama in Japan, or Shanghai in China, we search for some Yankee, wide awake in the early morning, and we are told for the first time that Monday

has come. Everywhere now we bring Monday, and in twenty-four hours by the chronometer after starting, we are in New York again, and find the merchants taking down their shutters, and the Monday newspapers telling us what has happened during our absence.

THE RIGHT TO FREE HIGHWAYS.

Why is it that in all the bills and bids we hear of for the construction of railroads or bridges in, above or under our streets and rivers, and among all the proposals or demands of compensation to the public for these lucrative public grants, the one thing we *never* hear of is that excessive profits shall be applied to the cheapening of fares for the million? Why is it that projectors propose to pay license fees into the public treasury, or to divide their profits with the school fund—interests already provided for and sure to be sustained—but shrink from the business-like and beneficent plan of reducing their fares and enlarging their traffic progressively, to any extent which will still yield lucrative returns.

Time is more than money: it is life: and rapid and cheap locomotion is life and money in a double sense, to the industrious and especially the industrious poor. They cannot always afford to pay twenty cents an hour for life; but it might and ought to be afforded them, though the medium of cheap and rapid locomotion, at five or ten cents an hour, with the blessings of pure air and moderate rents beside. The legislature which will provide for a system of rapid conveyance to and from and throughout this city and its suburbs, with a steady compulsory reduction of fares as fast and as far as consistent with a liberal but not inordinate profit and with due regard to safety and comfort, will do an amount of good and earn a grateful remembrance not often open to any body of men in the course of a century. Such a system, we believe, would speedily reduce all city fares to three cents, and all fares from the city to the remoter suburbs to six cents; while the improvements in economy of propulsion yet before us in the future may ultimately make one cent each a profitable fare for the daily moving millions of the city that is to be.

There can be no doubt that, on sound principles of political economy and philosophy, all private property in public highways ought eventually to be extinguished, and the use of them for public or private traffic thrown open on equal terms to all, taxed only with an equitable proportion of the cost of maintenance, in the same manner as common roads. The proper aim of a public work is not profit for a few, nor even wealth and honor to the whole, but to economize the time, strength and means of every individual: for of the gains of individuals all public wealth consists. In the infancy of our country, the resources of all its individuals were organized or incorporated in some sort for making the roads, bridges and other public works esteemed indispensable, and these became at once common property and free to all. A continuance of the same principle of action would have made the railroads, canals, bridges and colleges as free as the common roads and the common schools. In an ideal republic of good men, devoted to public rather than private good, this would be possible and incalculably profitable. But in a republic of men as they are, selfish, and only forced into union of interests and resources by extreme necessity, nearly all progress in public works and institutions is necessarily left dependent on selfishness, and in order to have better roads, bridges, etc., it is necessary to allow certain individuals enormous profit and wealth as an inducement to build them. Nevertheless an eventual return to the primitive ideal of free common wealth in all that is in its nature common to all, should be persistently kept in view. There is a proper and a practicable limit to all these public grants, which will be strictly insisted on by every legislator who is at all qualified by sense and honesty for his trust. The profit of the road company is to be regarded only as a means to the true end, public accommodation and economy, and is to be used only so far as necessary to attain that end; not carried so far as to interfere with it.

The present tendency toward a re-absorption of railroad, telegraph and bridge property by the public and for public benefit, through the agency of Government, is a hint which may yet become an assertion of the principle embodied in the limitations of every charter, that all such grants are but temporary concessions, for the ultimate benefit of the commonwealth, and that when they have served their purpose and repaid their beneficiaries, they must return as public property. We are not prepared to say that the resumption of these grants by Government, especially with its present corrupt and wasteful character, would be an improvement. Nor does it matter what any one may say about it; for these practical issues will work themselves out in their own time and way, little affected by theory and advice. There is one direction, however, in which we think we can discern a practical drift in the nature of things; and it is illustrated in the peculiar principle of the proposal on foot for a railroad from the Missouri river to Texas, to be open to all parties for their own care and locomotives, by payment of tolls, in the same manner as canals usually are. There are reasons enough why railroads should eventually go the way that most turnpikes have already gone, becoming first toll roads, and eventually, in a distant future of greater common knowledge and wealth, free public roads. Monopolies are at best necessary evils, and that temporarily, and their manifest destiny in every case is to go down before the paramount rights and interests of the whole, sooner or later, after they have served their temporary purpose.

In regard to the internal highways of a metropolis like this, we may assert as an axiom that there is no more reason for making the rails, tunnels and bridges private property than for providing the pavements, sidewalks, street crossings, lamps, sewers, Croton water, public parks, etc. etc., on the same principle. The evils of the private property system as applied to this class of public works (to which may be added the gas service) are such as the community literally groan under, without a hope of remedy. On the other hand, the beneficent success of the system of public works under which the Croton Aqueduct and Central Park were constructed, is a standing refutation of all arguments against the extension of such a system to the construction of a complete and satisfactory network of free public ways beneath or above our present crowded thoroughfares and rivers, and the equitable resumption of the much-abused privileges of all our city railroad and ferry companies. We invoke the attention of the legislature to some statesman-like and far-reaching measure of democratic progress; for which the people can afford to wait a little in preference to riveting tighter the bonds of the present undemocratic monopoly system for the sake of temporary convenience.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING FEB. 12, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

61,914.—Arm for Car Seats.—Albert L. Babcock, New Haven, Conn.

I claim the seat-arm herein described as an improved article of manufacture.

61,915.—Device for Oiling Spindles, Top Rolls, etc., of Spinning and other Machinery.—Samuel H. Barber, East Greenwich, R. I.

I claim the combination of the tubes, constructed and operating substantially as described, with the various machines used for manufacturing cotton, wool, and other material, for the purpose and substantially as herein set forth.

61,916.—Steam Engine.—John S. Barden, Providence, R. I.

I claim the improved steam engine, constructed not only with the two connected heads, C D, to its piston, and with the exhaust passage, d, extending from the steam chest, laterally, into the space between the said two heads and out the side of the cylinder, but as provided with the lever, G, to extend between the two heads and into the slide valve, H, such lever being for operating with such slide valve, in manner substantially as explained.

I also claim the combination of the mouth piece, L, with the force pump and steam engine, arranged and so as to operate substantially as specified.

61,917.—Mode of Treating Saccharine Matters.—Edward Beanes, London, England.

I claim subjecting saccharine matters to the action of ozone, substantially as and for the purpose described.

61,918.—Apparatus for Carbureting Gas.—W. W. Bierce, Cleveland, Ohio.

First, I claim the float, D, perforated tin, F, and covering, F', as arranged, in combination with the sleeve, G, tube, B, and slot, C, for the purpose and in the manner substantially as described.

Second, The shield, K, pipe, B, and sleeve, G, in combination with the case, A, for the purpose and in the manner as herein set forth.

61,919.—Blower.—George W. Bigelow, New Haven, Conn.

I claim the combination of the revolving valve, E, with the vibrating piston, D, substantially as and for the purpose herein set forth.

61,920.—Die for Forming Spike Heads.—Reuel Blackwood, Philadelphia, Pa.

I claim a die consisting of the parts, A and B-D B-D, constructed substantially as described, and operated by any suitable machinery, substantially as and for the purpose set forth and described.

61,921.—Cap for Preserving Jars.—Joseph Borden, Bridgeton, N. J., assignor to F. & J. Bodine, Philadelphia, Pa.

I claim a cap consisting of a disk, B, and arms, b b, the whole being constructed and adapted for attachment to a jar, substantially as described.

61,922.—Coal Stove.—Albert Brown, Troy, N. Y.

I claim, in combination with a fire-box and combustion chamber of stoves, a fuel magazine or reservoir, A, as provided with lateral vents or apertures, a a, substantially in the manner as herein described and for the purpose set forth.

61,923.—Sash-spring Holder.—Reuben F. Brown, Lewisburg, Pa.

I claim as a new article of manufacture, the arrangement and combination of the casing, A, its solid base, H, and notches, a a', latch, B, spring, D, covering plate, C, all constructed and operating in the manner and for the purpose specified.

61,924.—Clothes-line Reel and House.—M. H. Card and A. Sallee, Fulton, Ill.

We claim, in a clothes-line reel, the combination and arrangement of the flanged drum, G, the spring, C, house, J, and stop, L, all operating as and for the purpose specified.

61,925.—Churn.—William L. Card, Gardiner, Ill.

I claim, the combination of the revolving churn and stationary dashers, the hollow shaft, a, and removable spindles, F, arranged and operating substantially as and for the purposes specified.

61,926.—Screw Gage.—J. S. Copeland, Bridgeport, Conn.

I claim a screw gage constructed substantially as described.

61,927.—Hymn and Tune Book.—Ebenezer Curtice, Yonkers, N. Y.

I claim, First, In singing books having their leaves cut, as herein described, the use of whole leaves, intervening the cut leaves, for the purpose mentioned herein.

Second, The application of a holder, in the manner and for the purpose herein specified.

61,928.—Carpet Stretcher.—George O. Dunlap, Chicopee, Mass.

I claim, First, The spring, D, arranged upon the plate, A, in combination with the projections, b b', substantially as herein shown.

Second, The claws, E E, in combination with the carpet stretcher, substantially as shown.

61,929.—Wrench.—Timothy Earle, Valley Falls, Smithfield, R. I.

I claim the invention in wrenches, described, consisting of a movable jaw, C, provided with a serrated or equivalent, roughened surface, a a', in combination with a spring clamp, F, or its equivalent, substantially as set forth.

61,930.—Machinery for Drying Paper in Paper-making Machine.—Oliver Ellsworth (assignor to himself and Richard Smith), Boston, Mass.

I claim graduating the supply of steam to the cylinders which dry the paper by the expansion and contraction or tension of the paper made and dried.

Also, in combination with the drying cylinders, the movable roller over which the paper passes, and the link and lever which connect it to the valve in the steam pipe which supplies the drying cylinders.

I claim making the link which connects the movable roller with the regulating valve detachable and connecting it to a roller held in place by the paper, by the mechanism described, or its equivalent, so that when the paper breaks and releases the roller, the connecting mechanism will detach the link so that it will cease to operate the valve in the steam pipe.

I also claim making the link, x x', adjustable in its length, by means of a slotted slide and screw, or other equivalent device.

61,931.—Preparing Soluble Silica, and in Applying the same to Useful Purposes.—Anthony L. Fleury, Philadelphia, Pa. Antedated Dec. 28, 1866.

I claim the process, herein described, for preparing hydrated silica.

I also claim, as a new manufacture, hydrated silica, prepared substantially as described and set forth.

I further claim the improvement, herein described, in the manufacture of artificial stone, marble, paints, cements, and the like, substantially as described.

61,932.—Straw Cutter.—Warren Gale, Chicopee Falls, Mass.

First, I claim the pressure cylinder, A, constructed substantially as described, and geared to the cutting cylinder, B, in such a manner that the edge of the knife or knives shall, at the point of contact with the pressure cylinder, move at equal speed therewith, when the said pressure cylinder is constructed of disks of wood, rawhide, leather, or other similar material, not including metals of any kind, and is of full cylindrical form, substantially as set forth.

Second, In combination with the above claim, sliding box, A, screws, E E, spring, D, operating as described and for the purposes set forth.

61,933.—Straw Cutter.—W. Gale, Chicopee Falls, Mass. Antedated Aug. 12, 1866.

First, I claim the pressure cylinder, B, constructed as described, and having its entire periphery covered with a surface of soft metal, in combination with a knife-cylinder, provided with oblique or spiral knives, when the said cylinders are constructed and operated so that the edge of a knife, at the point of contact with the soft metal, shall move at the same speed as the pressure cylinder, substantially as and for the purposes specified.

Second, The sliding boxes, c, springs, S, and screws, E, in combination with the devices claimed in the first claim.

Third, The spiral knives, K, when secured in spiral grooves, b, in the cylinder, G, when the said cylinder is geared to the pressure cylinder, B, all constructed and arranged substantially as above described.

61,934.—Machine for Straightening the Weft or Figures of Textile Fabrics.—James Greenwood, Clinton, Mass.

I claim the machine, substantially as and for the purposes described, that is, as composed not only of a straightening roller, made expansible and contractible, as set forth, but of rollers, or their equivalents, for presenting the cloth to the action of such roller and moving such cloth with respect to it, substantially as explained.

I also claim the combination of the adjustable lever, or its equivalent, with the straightening roller, supported as described, and combined with rollers, or their equivalents, for presenting a piece of cloth to the action of such roller, in the manner and for the purpose as set forth.

61,935.—Belt Clasp.—Philander Harlow, Hudson, Mass., assignor to himself and Asa F. Hall.

I claim the belt fastening, composed of the two plates, A and C, constructed and operating together in the manner and for the purpose substantially as described.

61,936.—Edible Preparation from Indian Corn.—J. W. Haskins, Charlestown, Mass.

I claim the improved edible composition, as made of maize and gum acacia, or the same and one or more sweetening or flavoring matters or substances, substantially as set forth.

61,937.—Steering Apparatus.—Horatio F. Hicks, Grand View, Ind. Antedated Jan. 28, 1867.

First, I claim the arrangement of the pistons, S S, rods, L, index, M, and pointer, d, substantially as and for the purpose specified.

Second, The arrangement of the levers, H H, with levers, a a, and rods, K, by means of which the boat may be steered from forward or aft, substantially as set forth.

61,938.—Machine Gearing.—Alonzo Hitchcock, New York City. Antedated Jan. 30, 1867.

I claim distributing the power around the shaft to be driven so that the tendency to displace the shaft on one side is counteracted by that on the other by the means and in the manner substantially as described.

61,939.—Harness Clamp.—Thomas B. Hodge, Francistown, N. H., assignor to himself and D. McCaine, Groton, Mass.

I claim the above described arrangement and combination of the clamp, D, the looped straps, C C, the bed piece, A, the rod, E, and the ratchet, F, and catch, H.

Also, the combination therewith of one or more of the auxiliary bed pieces, i, made substantially as described.

61,940.—Sorghum Stripper.—A. D. Huff and L. D. Huff, Clinton, Iowa.

We claim the knife, C, provided with two cutting edges, d e, the first for topping with an endwise thrust, and the other for cutting when drawn back, when combined with the forked guides, b b, of the stock, A, and solid curved stripper, F, arranged and operating substantially in the manner and for the purposes described.

61,941.—Animal Trap.—Henry Lee, Oberlin, Ohio.

I claim the fall, F, armed with teeth or points, F', standard, G, and yoke, H, in combination with the post, B, baited lever, D, and staple, I, as and for the purpose set forth.

61,942.—Fence.—J. C. Leonard, Union City, Mich.

I claim the combination of inclined stakes or pickets with a horizontal supporting wire or rod when said stakes are slotted or kerfed to receive the wire, are prevented from spreading apart at their base, all substantially as herein described and illustrated.

61,943.—Cultivator.—Ivory Lord and Sewall Woodman, Saco, Me.

First, We claim the shank, s, as shown in all the figures of the drawings, elongated, and perforated as described, and the brace, b, connected therewith.

Second, The attachment of the teeth by the rods or arms at a distance from the wood, as shown in Figs. 1 and 4, and secured in place by nuts and keys, as described.

Third, The mode of widening or narrowing the machine by sliding the teeth on the arms, r r h h, in Fig. 4, and the combination of all, forming the cultivator as represented and described.

61,944.—Harvester.—James S. Marsh, Lewisburgh, Pa.

First, I claim casting the platform, C, in one piece with a tool box on its upper surface to give the required strength to this platform, and with recesses in its outer corner for gears, c2 c5, substantially as described and shown in Fig. 2 of the drawings.

Second, The double-hinged joint platform supported upon inner and outer caster wheels, H H,, in combination with the adjustable transverse bar, D', and drag bar, E, substantially in the manner and for the purpose described.

Third, In combination with the hinged platform, caster wheels, H H', suspending devices, D' and E, I claim the lever, F', and link, d', substantially as and for the purposes described.

Fourth, The combination of the lever, F2, with the hinged cutting apparatus and draft frame, transverse bar, D', link, d,, drag bar, E, and transverse, D2, all arranged and operated substantially in the manner and for the purpose described.

Fifth, The combination and arrangement of the forward adjusting device, F', with the rear adjusting device, F2, each having a separate axis whereby the ordinary adjustment is retained and the adjustment of the pitch of the points of the guard fingers to suit the condition of the grass to be cut, substantially as described.

61,945.—Cooking Stove.—James Marshall, New Orleans, La.

I claim the combination of the columns, b, and ledges, a, with the oven, A, hollow grate bars, the oven, B, and openings, C, when covered by a cast cross bar, D, when these several parts are constructed and relatively arranged with respect to each other, as described for the purpose set forth.

61,946.—Apparatus for Extracting Paraffine, etc., from Oil.—J. B. Meriam, Cleveland Ohio.

First, I claim the stanchions, G, pulleys, d N and O, as arranged in combination with the frames, A, and pan, B, for the purpose and in the manner as set forth.

Second, The cross head, D, friction rollers, c', in combination with the stanchions, G, as arranged and operated by the link, K, and levers, L, for the purpose in the manner specified.

Third, The cylinder, P, as constructed with ribs or corrugations, b, on the inner surface, as and for the purpose specified.

Fourth, The follower, E, with the dependent arms, C, in combination with the cylinder, P, for the purpose and in the manner as substantially as described.

Fifth, The arrangements of the cases, S, bucket, U, pipe, T, in combination with the tank, Q, provided with the perforated bottom, R, as and for the purpose set forth.

Sixth, The cases, S, buckets, V, in combination with the tank, Q, and freezing mixture, for the purpose and in the manner as described.

61,947.—Caster Frame.—Frederick J. Miller, Brooklyn, N. Y.

First, I claim the caster frame whose base is provided with receptacles or compartments for salt, sugar, etc., when constructed in the manner described and shown.

Second, I claim the combination of the base, a, and the spring or holder, f, when applied to a caster frame, in substantially the manner described and shown.

61,948.—Dumping Wagon.—George N. Munger, New Orleans, La.

I claim the frame work, D and E, which supports the body, the one part being fixed to the body and the other to the forward axle, and the two parts hinged together and combined with a device for securing the two axles in

their proper relative positions, the whole constructed and arranged so as to operate substantially in the manner and for the purpose specified.

61,949.—HARDENING IRON.—Harvalin Paddock, St. Johnsbury, Vt.

I claim the within-described process of hardening iron with the employment of carbonate of iron and carbon in a finely-divided state, applied in the manner substantially as herein set forth.

I also claim the combination of common salt, carbonate of iron and carbon in a finely-divided state, as a material for hardening iron, when u ed substantially as herein set forth.

61,950.—COMBINATION OF STAMP HOLDER AND INKSTAND.—Philander Perry, Charlestown, Mass., and Joshua Brooks, Newton, Mass.

First, We claim the stamp holder, O, having openings in the cover with chambers containing each a plunger, o' and c, used with or without springs, substantially as and for the purpose described.

Second, We claim, in combination with a stamp holder, the well, G G, with a rotating cylinder, H, thereon, constructed substantially as and used for the purpose described.

Third, We claim the combination of the mucilage pot, I I, and the sand box, I I, with one inkstand, substantially as described.

Fourth, We claim the grooved steps, C C C, for holding pens and pencils in combination with an inkstand, constructed and used substantially as described.

Fifth, We claim the corrugated pen wiper, substantially as described.

Sixth, We claim the two standards, Q Q, with the ears, R and e, fitted to receive a calendar, when used in combination with an inkstand and constructed substantially as described.

Seventh, We claim the combination of the stamp holder, finger wetter, mucilage pot, sand box, pen rack, and calendar stand, with an inkstand, all constructed substantially as shown and used as described.

61,951.—HOLDBACK IRON FOR CARRIAGE THILLS.—Russel B. Prindle, Norwich, N. Y.

I claim the holdback iron or stop, A, substantially as and for the purpose set forth.

61,953.—HARVESTER.—Amos Rank (assignor to the Ætna Manufacturing Company,) Salem, Ohio.

First, I claim securing the finger beam rigidly to a rocking shoe, J, which is sustained at its front end by means of a transverse brace, H, which has a hinged connection with the draft frame and is coupled to the drag bar or brace G, by means of devices, i and j, or their equivalents, and at its rear end to an angular projection, G' of a longitudinal brace, G, all constructed and operating substantially as described.

econd, in combination with a shoe hinged as at h, the two braces, G and H, coupled together by means of devices, i j, or their equivalents, which will admit of the rising and falling of the front end of the shoe, J, substantially as described.

Third, The construction of the drag bar, G, with the projection, G', on its rear end said projection, G', and the bar being wro ght metal and in one piece, substantially as and for the purpose described.

Fourth, The combination with the two-wheeled draft frame and the gearing thereof, of the compound braces, G G' H, coupled together by the loose connection, i j, and the double-hinged shoe, J, substantially as and for the purposes described.

Fifth, The arrangement of the transverse brace, H, angular drag bar or brace, G G', coupled loosely together and a depressed hanger of a two-wheeled draft frame, said wheels being independent drivers, all substantially as and for the purpose described.

61,953.—HARVESTER.—Amos Rank (assignor to the Ætna Manufacturing Company), Salem, Ohio.

I claim providing for keeping the sickle and pitman rod of a combined reaper and mower in a straight line vertically by means of a gage collar, h, applied to the swivel pin, a, substantially as described.

61,954.—MINCING KNIFE.—Helen M. Remington, Springfield, Mass.

I claim the sectional stems or shanks, h, with the knives, c, in combination with the cylindrical clamp or ring, a, and the socket, g, substantially as herein described and for the purpose set forth.

61,955.—MACHINE FOR GRINDING SAWS.—John Richards, Columbus, Ohio.

First, I claim the arrangement substantially as herein described, whereby saw blades are supported, fed up to the position desired, adjusted at different angles with respect to the face of the carriage, D, and bevelled on both sides, all substantially as set forth.

Second, The combination of the two screws, a' d, with the sliding carriage, D, of a saw-bevelling machine, substantially in the manner described.

Third, The combination of the shouldered holder, K h, hinged adjustable support, G, and curved gage, g', substantially in the manner and for the purpose described.

Fourth, The hard metal-shouldered holder, when constructed to operate as described.

61,956.—COOKING STOVE.—J. J. Savage, Troy, N. Y.

First, I claim the location of the fuel door way or feed mouth, B below and forward of the combustion chamber, C, of stove furnaces and in such immediate position to the fire-box, A, as to operate in manner substantially as herein described for the purposes set forth.

Second, When operated in combination with and through said located fuel doorway, B, in mann r as and for the purpose described, I claim the lever feeder, constructed substantially as set forth.

Third, In combination with the front plate, D, of stove furnaces, I claim the arrangement of a fire or guard plate, E, in position above the fuel doorway, B, of the fire box, and about opposite the combustion chamber, C, substantially in manner and for the purpose as set forth.

Fourth, In combination with the fuel doorway, B, when located substantially as described, I claim the arrangement of the front plate, D, of stove furnaces, in an inclined or slanting position such as to overhang the fire box and combustion chamber of the furnace, substantially in the manner and for purpose as herein set forth.

61,957.—CHEMICAL COMPOSITION FOR BLASTING ROCKS.—Charles Seidel, New York City.

I claim the above-described composition of matter, substantially as and for the purposes described and set forth.

61,958.—PAVEMENT.—William H. Shurtteff, Providence, R. I.

First, I claim a paving block composed of wood and iron or other suitable metal comoined and applied to each other, substantially as shown and set forth.

Second, The combination with a wooden block of suitable form of a skeleton or open-work metal cap or frame applied to the said block in such a manner that the fibers of the wood shall be compressed between the sides of, and forced up into the openings in the top of the said cap or frame, substantially as shown and describe i.

Third, The skeleton or open-work metal cap for paving block herein described the same consisting of a frame of iron or other like material, the sides of which extend a suitable distance below the bars forming the top of the frame, the said bars being wedged shaped or tapering toward their lower ends, and arranged so as to form a grating or lattice work, substantially as and for the p.rposes shown and set forth.

61,959.—CHEESE VAT.—Alanson Slaughter, Middletown, N. Y.

I claim the arrangement and combination of the hot water trough, A, with its recess, C, the steam and drip pipes, D E, the corrugated disseminator, F, and milk vat, G, with or without the agitator, E, substantially as and for the purpose herein specified.

61,960.—PORTABLE PISTOL GALLERY.—Fisher A. Spofford and Matthew G. Raffington, Columbus, Ohio.

First, We claim a miniature portable pistol gallery, constructed substantially as shown and described.

Second. The gun and turret, Figs. 3 and 8, arranged and operating in the manner and for the purposes herein described.

61,961.—RAILROAD-TIME INDICATOR.—R. C. Taylor, Brockport, N. Y.

First, I claim the employment of a series of adjustable cams, C C, with a graduated cam wheel, B, and an escapement lever, D, or equivalent, operating substantially as described and for the purpose set for h.

Second, Making the wheel, B, in two parts, c d, when combined with the cams, in the manner and for the purpose specified.

61,962.—METALLIC CARRIAGE WHEELS.—Adam P. Ware, Camden county, N. J. Antedated Jan. 28, 1867.

I claim constructing a wheel for carriages, substantially as described, when the fellies, B, are made of malleable iron, and constructed and fitted together with the plates, b, nuts, a, and spokes, C, in the manner described.

61,963.—EXCAVATOR AND POTATO DIGGER.—Benjamin O. Warren, Elkhart, Ind.

First, I claim the central carrier, C', as arranged relatively to the inclined plane of the shovel, b, in combinat on with the larger carrier, C, substantially in the manner and for the purpose as herein set forth.

Second, The longitudinal frame, B, arranged in combination with the beams, A, axles, a, and carrier, C, substantially in the manner and for the purpose as herein set forth.

Third, The guide lever, G, in combination with the frame, B, and shovel, b, substantially in the manner and for the purpose as herein set forth.

Fourth, The semicircular plate, f, lever, e', hooked spring, e, and windlass, F, as arranged in combination with the beams, A, and frame, B, substantially in the manner and for the purpose as herein set forth.

Fifth, The box, I, provided with a movable bottom, in combination with the double carrier, C' and C, substantially in the manner and for the purpose as herein set forth.

Sixth, The boards, i, of the bottom of the box, I, having eccentrically constructed pivots, j, on their ends, and so arranged as to drop by their own gravity, substantially in the manner and for the purpose as herein set forth.

Seventh, The lever, g, windlass, H, and loop, l, in combination with the chain couplings, k, of the board, i, of the box, I, substantially in the manner and for the purpose as herein set forth.

61,964.—FURNACE AND FIRE-PLACE GRATE.—George Warriner, Little Ilford, England.

I claim, First, The inverted cone or pyramid, or the air-excluding screen or apron, sealed at the bottom by water or other liquid, as herein set forth.

Second, In combination with the above, I also claim a hollow furnace or fire bars, or tubes, in conjunction with solid grate bars, connected with a hollow-bearing bar or bars, whereby steam, air, or gas is introduced to support combustion, the introduction thereof being regulated by any convenient suitable means, substantially as herein specified.

Third, I also claim introducing petroleum or other such like inflammable substance or gases through tubes over, or by the side of, or underneath the fire, as hereinbefore stated.

Fourth, I claim the application or adaptation, in the manner hereinbefore described, of pipes or tubes in furnaces or fire places, in immediate juxtaposition with ovens or other cooking apparatus or heating chambers, which pipes or tubes admit heated air into the oven or other chamber to be heated

61,965.—PEAT MACHINE.—Darius Wellington (assignor to Cornelius Wellington), Boston, Mass.

I claim the combination of the cylinder, d, and its reducing and pressing mechanism, the mold cell, c, and pit, i, and the follower, l, when the whole are constructed and arranged to operate together, substantially as shown and described.

I also claim so combining the driving shaft, a, by which the follower is directly operated, and the mill shaft, e, that the pressure upon the peat may be increased or diminished relatively to each reciprocation of the follower, substantially as set forth.

Also forming the bed of the mold cell of the stone, n, and for the purpose set forth.

Also combining with the cylinder, b, the cutting edge, n, operating as set forth.

61,966.—FIRE BRICK.—Samuel K. Wellman, Nashua, N. Y.

I claim the composition of fire clay and quartz, or fire clay and plumbago or black lead, about in the proportions specified, for the manufacture of fire-brick crucibles and other vessels or articles which are to be subjected to an intense heat.

61,967.—RAILROAD SWITCH.—George Westingham, Jr. Schenectady, N. Y.

First, I claim a portable railroad switch having double branch tracks, D D, which converge as shown, and are insersected by grooves, H H, substantially as set forth.

Second, I also claim the double grooved frog, C, having branch track, D, in combination with the switch bar, E, substantially as set forth.

Third, I also claim the retention of the rests, F, of the branch tracks, D, backward, so as to form a bearing surface for the switch bar behind its joint, substantially as shown.

Fourth, I also claim the combination of the double grooves, the right and left branch tracks, and the track, I, at the forward end of the frog, C, substantially as shown.

61,968.—MANUFACTURE OF PAPER BOXES.—Seth Wheeler and Edgar Jerome, Albany, N. Y.

First, We claim, in the manufacture of ho'low paper articles directly from paper pulp by mechanical pressure, means substantially as described, whereby the water is allowed to escape freely, and form is given to the pulp at on e operation as set forth.

S cond. We claim the combination of vertical and horizontal followers in a machine adapted for making paper boxes and other hollow art cles from pulp, substantially as and for the purpose described.

Third, We claim the combination of a perforated die and a follower or followers in a machine adapted for making paper boxes from pulp, substantially as described.

Fourth, In a machine adapted for making paper boxes and other hollow articles, we claim the use of a light, rigid frame upon or within which the article of pulp is formed, said frame being removable from the di.e, substantially as and for the purpose set forth.

61,969.—MANUFACTURE OF BOXES FROM PAPER PULP.—Seth Wheeler and Edgar Jerome, Albany, N. Y.

First, We claim a new article of manufacture, to wit, the paper box with its body and the rim of its top pressed into form directly from paper pulp, and the end pieces of the body and top cemented in place, substantially as described.

Second, A box top, as a new article of manufacture, made as described.

Third, The body and bottom of a box, as a new article of manufacture, made as described.

61,970.—HORSE SHOE NAILS.—Albert S. Wilkinson, Pawtucket, R. I.

I claim the horse shoe nail, B C, for securing nails to the feet of animals having a slow tapering head, B, passing quite through the shoe or through the lower plate of a double shoe, substantially in the manner and for the purpose set forth.

61,971.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

First, I claim the placing of a toe clip, B, on one side of the toe of the shoe, so as to be mainly opposite one of the heels of the shoe, when the said opposite heel and toe clip are used to secure the shoe to the foot, while one heel of the foot is free for lateral expansion, substantially in the manner and for the purpose set forth.

Second, I claim a clamp ng band, K K', running from one heel of the shoe over in front of the hoof, and fastening to the toe of the shoe opposite to the starting point at the heel, in combination with the heel rest, j, substantially in the manner and for the purpose set forth.

Third, I claim the ratchet-headed clamping screw, h i, in combination with the catch or detent, m, Fig. 2, substantially in the manner and for the purpose set forth.

Fourth, I further claim the combination of the heel clip, b', band, K, and the bar clip, J, arranged substantially as herein represented, to firmly clamp one side of the heel of the hoof.

61,972.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

I claim a continuous clip, B B' b g j, in combination with the bar, A, elevated at the toe, B', and heel, b, and having the arms, g j, extending upward and taking hold of the heel of the foot, the heel clips being fastened by the button fastening, h i, substantially in the manner and for the purpose set forth.

71,973.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

First, I claim a rubber sole, B, extending over the whole sole of the foot, in combination with a stiffening metallic shoe, a, substantially in the manner and for the purpose set forth.

Second, And, in combination with the above, I claim the metallic shield, k, substantially in the manner and for the purpose set forth.

Third, I claim the air cushion, P, in combination with the flap, R, substantially in the manner and for the purpose set forth.

61,974.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

I claim a round-bottom shoe, A, Figs. 1 and 2, armed and protected at the heel and toe with steel plates, e e e, substantially in the manner and for the purpose set forth.

61,975.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

I claim a calk formed by parts, d f d, placed alternately on the outer and inner edge of the bar, A, substantially as shown and described.

61,976.—MOLDING SASH WEIGHTS.—Samuel Williamson, Cincinnati, Ohio.

First, I claim the iron cut off or stop, D, when applied and used in casting weights.

Second, The application and use of the hora-shaped conical iron chill or sand cores, E E, in casting weights.

Third, I claim the extension and use of the stops, D D, and the cores or cells, E E, whether used separately or in combination in casting weights, substantially as set forth and described.

61,977.—DIES FOR MAKING KNOBS.—Joseph Wise (assignor to Thomas Kennedy), Branford, Conn.

First, I claim the combination and arrangement of the socket, C, and spindle, D, provided respectively with projections, a and d, and arranged to op rate substantially in the manner described.

Second, In combination with the above, I claim the arrangement of the spindle, I, as and for the purpose specified.

61,978.—MANUFACTURE OF VINEGAR.—Harry P. Witbeck, Rochester, N. Y. Antedated August 12, 1866.

I claim the process of producing a liquid for vinegar or acetic acid from the produce of the mixture of grains, as herein described, by passing the same through a filter, for the purpose of purification, substantially as herein specified.

I also claim the rapid process of acidulating the liquid by subjecting it to a charge of pure oxygen, as herein described.

61,979.—BUCKLE.—Henry S. Woodruff, Jamesville, Wis.

First, I claim the application to the cross bar, b, and on the outer surface of a buckle of a fixed or rigid tongue, g, when arranged and used substantially as and for the purpose set forth.

Second, The combination and arrangement of the cross bar, b, and tongue, g, with the cross bar, d, and tongue, f, substantially as and for the purpose set forth.

Third, The fixed and rigid tongue, n, when arranged and used substantially as and for the purpose set forth.

Fourth, The combination and arrangement of the tongue, g, and cross bar, b, tongue, i, and cross bar, d, and tongue, n, with the side bars, a, and end bars, c and e substantially as and for the purpose set forth.

61,980.—COMBINED CULTIVATOR AND PLOW.—Isaac Young (assignor to himself and Isham H. Hayes), Byhalia, Miss.

I claim the attachment, C, to shovel or other plows, when shaped and operating substantially as and for the purpose herein specified.

61,981.—CORN PLANTER.—John N. Arvin and Joseph M. Whitmore, Valparaiso, Ind.

We claim the driving pulley, E, and the friction pulleys, F F, in combination with the chain, c c, the rollers, d d, in the hoppers, g g, and the cam, k, the shaft, b, the pawl, m, on the vibratory rod, n, and the flaps, p p, in the shutes, h h, all arranged and operating as and for the purposes herein described.

61,982.—HORSE SHOE.—John Austin, Rockford, Ill.

First, I claim securing the shoes to the animals foot by means of the bolts, C, constructed and applied as shown and described.

Second, T e movable pieces, c, secured in the slot, n, substantially as and for the purpose set forth.

Third, I claim making the calk self-sharpening, by inserting within the body of the calk of a piece of steel, substantially as des ribed.

61,983.—FLOATING ANCHOR.—George V. Baker, Astoria, N. Y.

I claim the combination of the spar, A, detachable planks, B, weight, C, and bolts, D, when constructed and arranged as herein set forth for the purpose specified.

61,984.—CEMENT FOR WALKS, FLOWS, PAVEMENTS, ETC.—J. S. Baldwin, Elmira, N. Y., W. H. Jones, Rochester, N. Y., and E. N. Gibbs, Elmira, N. Y.

We claim a cement formed by the combination of coal tar, coal pitch, sand, coke or coal ashes, furnace cinders or iron scale and rosendale cement, substantia ly in the proportions herein specified.

61,985.—MODE OF TREATING PEAT.—Hosea Ball, New York City.

The vertical conductor, B, and horizontal conductor, A, arranged at right angles to each other provided with corresponding screws, B E, independent of each other and operating substantially as and for the purpose specified.

61,986.—MUSQUITO BAR FOR WINDOWS, ETC.—V. Barker, Otisfield, Mass.

First, I claim the corners for a frame made from sheet metal as herein shown and described and for the purposes set forth.

Second, I also claim the bars, C, provided with grooves in which is fitted a tongue in combination with the socket corners, substantially for the purposes herein shown and described.

61,987.—HYDRAULIC PUNCHING MACHINE.—J. B. Barnes, Fort Wayne, Ind.

I claim an improved hydraulic punch formed by the combination of the large hollow screw, B, the small interior screw, C, and the plunger, G, with each other and with the yoke, A, substantially as herein shown and described.

61,988.—GAGES FOR SAW MILLS.—Jacob Behel and John Nelson, Rockford, Ill.

First, I claim the adjusting of fence, C, to any desired angle by means of two rotary motions, one around an axis in itself, and the other around an axis in B, or its equivalent.

Second, In combination with the fence, B, of a saw gage, we claim the block, E, slide, F, and set screw, J, when said slide is grooved to fit the inclined faces of the graduated way bar, L, and the latter is set into and is flush with the face of the saw table, the said parts being constructed and arranged substantially in the manner and for the purposes set forth.

61,989.—HOOKS AND EYES.—Andrew Bennett (assignor to himself and Joseph Oechler), Brooklyn, N. Y.

I claim as an improved article of manufacture, a hook, A, provided with side springs, a a, substantially as and for the purpose herein shown and described.

61,990.—HORSE SHOE.—Thomas B. Bishop, Baltimore, Md.

I claim, First, The combination of the artificial calk, b, and flange, a, formed above the base of said calk, when the calk bears upon the ground and the flange is adapted for being applied between the hoof of the horse, and the shoe, substantially in the manner and described.

Second, The combination of air passages, c, with the elastic sole or frog substantially as and for the purposes described.

Third, Serrating or grooving the bottom surface of the frog, b, substantially as and for the purpose described.

Fourth, The combined cushion and elastic frog or calk, constructed as described the same being a new article of manufacture.

61,991.—MUCILAGINOUS COMPOUND.—Victor G. Bloede, Brooklyn, N. Y.

I claim the gum produced by treating starch with a compound of nitric and hydrochloric acids mixed together, substantially as and for the purpose described.

Second, The within described process of producing gum from starch by treating the same with nitric acid in about the proportion herein set forth and drying it on metal sheets of a heat of about 200° Fah. as specified.

Third, The combination of oil of almonds with an aqueous solution of gum prepared by treating starch with acids, substantially as and for the purpose set forth.

61,992.—MODE OF TREATING INDIA RUBBER.—Stephen Bourne, Headstone Drive, Harrow, England, assignor to to himself and Theodore Bourne, New York City.

I claim deodorizing india-rubber or any compound of which it forms a part by means of charcoal, substantially as described.

61,993.—METAL BUNG.—William Boynton, Auburn, N. Y.

I claim, First, The screw, c, in combination with disk, B, the nut, d, and washer, e, the whole constructed and operating as and for the purpose herein set forth.

Second, The case, A, constructed in the manner and for the purpose substantially as herein described.

Third, A combination of a case, A, and disk, B, both constructed and operating substantially as herein set forth.

61,994.—PANEL FOR LAMP SHADES.—George M. Breuker (assignor to Breuker and Kessler), Philadelphia, Pa.

I claim the manufacture of panels for lamp shades by applying to the varnished surface of a sheet of mica or sheet of paper or other material on which two or more layers of oil color have been deposited as herein specified

61,995.—SOAP.—John Brucker, Chicago, Ill.

I claim the soap consisting of the above enumerated ingredients and prepared substantially in the manner herein described and specified.

61,996.—PRINTING PRESS.—William Bullock, Philadelphia Pa.

I claim the endless belts carrying the nippers in combination with the vibrating fly frame for throwing down the sheet and asserting its motion substantially as described.

61,997.—ALLOY FOR MOLD BOARDS AND OTHER PARTS OF PLOWS.—Oscar F. Burton, Jersey City, N. J.

I claim the manufacture of the mold boards-shares and other parts of plows and cultivators working in and exposed to the soil, of an alloy composed of copper, tin and zinc with or without antimony and lead or either substantially as specified.

61,998.—SKATES.—Charles Bushman, West Chester, Pa.

I claim the curls, e f, formed out of the same piece as the runner and arranged with regard to the heel and toe plate, and the runner as herein described and represented.

I also claim a raised circular socket, m, on the heel plate of the skate, and furnished with an elliptica ly shaped hole, n, in its top so that a screw head slightly filed away on its opposite sides and set in the heel of a boot or shoe, may enter and turn in said socket to form a fastening between the heel of the boot or shoe and the skate as herein described and represented.

61,999.—DIRT RECEPTACLE.—Cheamon Butterfield, West Waterville, Me.

I claim a dirt or dust receptacle having its cover or top, D, and bottom plate, F, connected together through rods, G and J, and swinging lever or beam, H, so as to operate substantially in the manner and for the purpose described.

62,000.—TRUSS.—Ephraim Capen, Batavia, Ill.

First, I claim the combination and arrangement of the shaft, c, provided with an inclined stationary shouldered, B, the nut, D, movable collar, C, and its pad arm operating substantially as described for the purpose of adjusting and securing the requisite pressure, as herein set forth and specified.

Second, I claim constructing the pad arm in two parts, E F, pivoted together as described for the purpose of affording a lateral adjustment to the pad, as herein set forth.

Third, I claim forming a boss, g, upon the arm, F, whereunto the pad is attached substantially as and for the purposes specified and shown.

62,001.—BUTTON FASTENING.—George J. Capewell, West Cheshire, Conn.

First, I claim a button provided with the cone, f, either as shown in fig. 1, or fig. V, of the drawings, substantially as and for the purpose specified.

Second, The combination of a single eyelet with the cone, e, either with or without the washer, d, substantially as shown and described.

Third, The two eyelets, f and f', in combination with the cloth, C, and the cone, e, either with or without the washer, d, when arranged and combined as and for the purposes set forth.

62,002.—TEA POT.—Alexander Carmichel, Westerly, R. I.

First, I claim the plate, B, arm, b, and slot, a', arranged relatively to the body, A, and the exit holes, a, substantially as specified.

Second, I claim the case, A2, combined and arranged as represented and extending upward from the slot, a' to a level above the top of the tea pot, substantially as and for the purpose herein specified.

Third, I claim in combination with the clearing plate, B, arm, b, and casing, A2, or their respective equivalents, the spring, D, adapted to operate substantially in the manner and for the purpose set forth.

Fourth, I claim the lever, E, arranged to operate in combination with the clearer, B, and the several connections, substantially as and for the purpose herein specified.

62,003.—DRILL.—G. F. Case, New York City.

I claim a diamond drill, having its diamonds arranged in two or more rows, substantially as described.

I also claim, in combination with the above, the diamonds when so set as to cut the entire surface of the rock, substantially as described for the purpose specified.

I also claim the loose collar or ring upon the drill-rod, substantially as and for the purpose described.

62,004.—CULTIVATOR.—E. Children, Lancaster, Wis.

First, I claim the friction roller, j, inserted in the pivoted dr ft pole, C, in combination with the bar, H, attached to the pivoted arms, h h, all arranged to operate in the manner as and for the purpose herein set forth.

Second, The links, I and T, shaped levers, J, applied to the plow beams and frame, A, to operate in the manner substantially as and for the purpose set forth.

Third, The securing of the plows, K, to the standards, L, by means of the staples, M, bars, r, and the keys, t, all arranged substantially as and for the purpose herein set forth.

62,005.—GRATE.—John S. Clark, Philadelphia, Pa.

I claim a stove or range grate, consisting of the fixed part, A, having the two series of parallel, alternate short and long bars, a1 a2, and the rotary part, B, having the two series of parallel, alternately long and short bars, b1 b2, the said parts being constructed and arranged to operate together substantially as and for the purpose described, and in combination with the subject matter of the preceding claim.

I also claim making the free ends of all the bars, a1 a2, b1 b2, deeper than the frame or shaft from which they project, and giving to the ends of the movable bars, b1 b2, the curved edge form shown, substantially as and for the purposes described.

62,006.—APPARATUS FOR DISTRIBUTING LIQUID MANURE.—J. Warren Clark, Iowa City, Iowa.

I claim the combination of a box wagon for containing water and earth, forming a puddling compound with a plow for cutting a trench connected with a mixer of the compound within the wagon box, and a hose or its equivalent for conducting it into the trench behind the plow, for the purpose of setting young trees or plants in rows, constructed and arranged substantially as herein described.

62,007.—BOILER FURNACE.—Thomas H. Clark, Indianapolis, Ind.

I claim the combination of a boiler furnace, when one or more boilers are arranged in the same longitudinal plane of the flues, E, made concentric in the transverse section with the bottom of the boilers, and which extend beneath the boilers in the direction of their length, and are separated from each other by ridges, S, with the transverse channels, L, and air channels, F and H', and the continuation of the partition between the boilers over the chambers, C', leaving a space under the boilers substantially and for the purposes as herein shown and described.

62,008.—SLEEVE BUTTON AND STUD.—Barnes Clayton, Philadelphia, Pa. Antedated Feb. 2, 1867.

I claim in combination with the shank and head of a shirt bosom stud, or sleeve button, the self-adjusting fastening, consisting of the hollow cylinder, 1, slide or bolt, 2, and spiral spring, 4, the same being constructed, arranged, and combined, and operating together, as and for the purpose described.

62,009.—LIFTING JACK.—Charles T. Close, Brooklyn, N. Y.

I claim a wagon jack, composed of the legs, A and B, and lever, when combined together, as and for the purpose described.

62,010.—NURSING COUCH.—James H. Cogshall, Lexington, Mich.

I claim the nursing couch, consisting of the support, A, screw, B, set screw, E, semi-circular arms, D, table, C, and straps, F, when constructed and arranged as herein set forth.

62,011.—LETTER ENVELOPE.—C. Conkling, Ashland, Ohio.

First, I claim the belt, D, and loops, B C, in combination with the envelope, substantially as described.

Second, The duplicate back, F, and loops, E, and envelope, substantially as and for the purpose set forth.

Third, The duplicate back, F, in combination with the envelope, as and for the purpose set forth.

Fourth, The self-sealing belt, D, in combination with the envelope, as and for the purpose set forth.

62,012.—CLAW BAR FOR RAIL.—Maxwell Cornelius, Cheviot, Ohio.

First, I claim the hinged double headed claw bar, A B B1 D, d, E E', constructed and adapted to operate as set forth.

Second, In combination with the above, I claim the single clawed auxiliary head, F, adapted to be hinged to the bar proper, and to operate in the manner set forth.

Third, The claws proper, B B', E E', adapted for ready removal and replacement, as set forth.

62,013.—LUBRICATOR.—Julien L. Courcier, Paris, France.

I claim the tube, c, in combination with the closed reservoir, a, and tube, g, substantially as herein set forth for the purpose specified.

62,014.—DEVICE FOR FORMING HORSE COLLARS.—Isaac T. Crum, Chicago, Ill.

I claim the combination of the form, A, with the flanges, D, and standard, C, substantially as set forth.

62,015.—SOLE CUTTING MACHINE.—Timothy A. Curtis, Brookfield, Mass.

First, I claim supporting the knife holder, B, on an internal support in connection with the solid bearings of the holder, on the frame, at x' x, when the knife is swung half round between each cut by means of the levers, rack, and catch ring, or their equivalents, substantially as set forth.

Second, I claim raising the block and table in connection with the swinging knife, in the manner and for the purposes substantially as above described.

62,016.—TOE CALK FOR HORSE SHOES.—George Custer (assignor to himself and Charles Toll), Monroe, Mich.

I claim a toe calk provided with a recess, and a projection upon its inner and upper surface, all as set forth, and substantially as described.

62,017.—BOOT HEEL.—George W. Davis, Milford Center, Ohio.

I claim a cast metallic heel, constructed as described, in combination with the devices for uniting the same to boots and shoes, as herein set forth.

62,018.—MACHINE FOR PRESSING HATS.—Joseph De La Mar (assignor to himself and Abraham Emanuel), Brooklyn, N. Y.

First, I claim the combination of steam cylinder, d, d, piston, b, and steam ring, c, for the purposes of affording heated surfaces to press against.

Second, The application of hydraulic pressure into an expansible india-rubber hat, over which the hat to be pressed is placed.

62,019.—RAZOR STRAP.—Friederich Eichner, Chicago, Ill.

I claim the use of the four substances herein enumerated, in three different proportions as herein set forth, for the purpose of making three different kinds of razor straps, in the manner substantially as herein described and specified, for concave razors as the barbers use.

62,020.—SAW.—James E. Emerson, Trenton, N. J.

I claim the method of securing teeth inserted in or attached to a saw plate, by forming the dovetail of one or more rivets, permanently secured either in the saw plate or the tooth, in the manner substantially as shown and described.

62,021.—ICE PITCHER.—George A. Eno, Philadelphia, Pa.

I claim the inner casing of an ice pitcher, or water cooler, contracted at the ower end as described, for the purpose specified.

62,022.—TUBULAR GRATE.—B. Garvin and R. J. Pettibone, Oshkosk, Wis.

We claim the combination of the tubes, A, with the caps, B, when constructed and applied substantially as and for the purpose set forth.

65,023.—SCISSORS SHARPENER.—A. W. Gifford (assignor to himself and Henry D. Ward), Worcester, Mass.

I claim the serrated or file bar, B, with the sides, D C, provided with the spring, F, substantially as described, for the purpose specified.

62,024.—VAPORIZING AND BURNING GASOLINE FOR HEATING AND ILLUMINATING.—Henry Gilbert, Philadelphia, Pa.

First, I claim the screw stop, with or without valve at the bottom, intended to fill the reservoir or vessel with the combustible fluid from below.

Second, The stop cock, or its equivalent in the burner, serving to regulate the exit of gasoline vapors, and consequently the size of the flame.

Third, The filling of the lamp or burner, or both, with sawdust, charcoal powdered or otherwise, bone dust, cotton, flax, hemp, wool, rattan, jute, or other similar porous substance.

Fourth, The modification of said lamp, by omitting the metallic burner entirely, and burning it by means of a wick, covered or not covered by a cap of wire gauze, only burning without any wick by means of the metallic burner.

Fifth, The use of a bundle of fine metallic wire in the openings and stop cocks of cans, bottles, tanks, barrels, or other reservoirs, for fluid combustible substances, giving a better ingress and egress to the liquid material, than is the case with wire gauze, and acting as an improved safety arrangement in preventing any flame to communicate to the interior, and cause explosion.

62,025.—EVAPORATOR.—H. C. Gilbert, Cambridge, Vt.

I claim the combination of the shaft, D, cog wheels, G, racks, H, and sliding frame, I, with each other, and with the top, a', of the furnace, A, when said parts are constructed and arranged substantially as herein described, and for the purpose set forth.

62,026.—WASHING MACHINE.—J. S. Gochnauer, Goshen, Ind.

I claim the yielding bed formed of a series of radiating conical rollers in combination with the rubber, F, composed of a series of conical radiating rollers, and made in two parts, which are hinged together by a rod, e, passing through the vertical shaft, D, substantially as and for the purposes described.

62,027.—STAIR ROD.—W. B. Gould, New York City.

I claim the combination of a stair rod, A, and socket or hollow tips, B, when they are constructed or arranged together so as to hold the rod, at either one or both of its ends, with an elastic or yielding pressure, substantially as and for the purpose described.

62,028.—CAR COUPLING.—Ransom W. Green, Bradford, Pa. Antedated Feb. 10, 1867.

I claim the arrangement of the flanged draw head, B, the link, I, the shouldered pin, E D, guide frame, C, and the shouldered spring arm, H, G, operating substantially as described.

62,029.—CARPET BEATER AND CLEANER.—W. H. Hankinson, New York City.

First, I claim the two pairs of feeding rollers, B and C, and the cylindrical brush, F, made self-adjusting as described and arranged in relation with each other, and with the supporting cords, E, and flexible beaters, a', substantially as herein set forth, for the purpose specified.

Second, The stiff brushes, c, arranged upon a rotating frame in combination with the feeding rollers, B C, and cylindrical brushes, F, substantially as herein set forth for the purpose specified.

62,030.—HORSE POWER.—Theopilus Harrison (assignor to himself and William C. Buchanan), Belleville, Ill.

I claim the arrangement of the pinion, D, and the pinion, D', shaft, F, and pinion, H, diagonally with the pinion, H', and the shaft, E, in combination with the master wheel, A, constructed in the manner and for the purpose specified.

I also claim the elliptical or oval pin or axle, B, of the master wheel, A, in connection with the two pinions, D D', and separate shaft, F F, substantially as and for the purpose set forth.

62,031.—HEATING STOVE.—Thomas Henney, Dubuque, Iowa.

First, I claim the combination of the branch pipes, I, inlet pipe, H, pipes, G G', damper, J, central fire cylinder, A, hollow base, B, cap section C, and the pipes, D D', all arranged and operating substantially as and for the purpose described.

Second, The combination of pipes, H I, with the pipes, G' and D', applied to a stove composed of sections, A B C, and pillars or pipes, substantially as described.

Third, Providing for securing the several movable sections of the stove together by means of rods, nuts and flanges applied to the air pipes, G, substantially as described.

Fourth, I claim the arrangement of the air pipe, G', opening at the top and bottom of the stove, and passing through the exit pipe, D', and damper, E, substantially as described.

62,032.—PRINTING PRESS.—John Henry, Jersey City, N. J.

First, I claim the arrangement in combination with the reciprocating distributing table, C, of disc distributors, D D, for action in concert with distributing rollers, substantially as specified.

Second, The combination with the inking rollers, distributing rollers, table, C, and disc, D D, of separate fountains, E F, essentially as and for the purpose or purposes herein set forth.

62,033.—BURGLAR AND FIRE ALARM.—Josiah Holmes and Charles W. Nickerson, Pittsburg, Pa.

First, We claim the plate lever, n, with the slot, s, in combination with the catch rod, m, and scape wheel, h, when arranged and operated in connection with a clock alarm, substantially as and for the purposes herein described.

Second, The guard cords, v v, with their ends, v v', the spiral springs, r r, and the lever, n, combined, arranged, and operating substantially as and for the purposes set forth.

62,034.—HORSE RAKE.—Edgar Huson, Ithaca, N. Y.

First, I claim the spring B, anterior to the rake head for the purpose of relieving the labor of operating the rake and also for the purpose of a quick upward motion of the teeth, so that the hay or other article raked shall not be bound by the forward motion of the horse, between the teeth, and the stripers or cleaners of the rake.

Second, I claim the combination of the spring B, rod E, and head lever F, as described.

Third, I claim the rake head O, P, teeth I, and staples J, all constructed and arranged substantially as and for the purposes set forth.

62,035.—HARVESTER RAKE.—Robert V. Jones and Henry Fessler (assignors to themselves and James Short), Canton, Ohio.

We claim, First, The circular metallic case A, provided with the wheels I, M, g and f, springs q, m, l, and r, in combination with the pins 1 and 2, treadles n and o, rack bar R, and wheel P, all arranged and used substantially as herein specified.

Second, The Quadranteal shaped platform D, with its slotted shield, hinged as described and the rake bar p, (connected to a stud at the geometrical centre of the platform) rake shaft y, tumbler u, and lugs j and j', for carrying the grain to the rear of the machine, the whole being constructed, arranged and operating as specified.

Third, The circular metallic case, constructed as described with rack bar R, and wheel P, in combination with the platform and rake, the whole being constructed and operating in the manner herein specified.

62,036.—DOOR LOCK.—Francis Just, Buffalo, N. Y.

First, I claim in combination with the tumblers B B, and a key bit, the bolt A, when constructed and operated as shown.

Second, I claim the catches F F, in combination with the key bit, for the purpose specified.

62,037.—MANUFACTURE OF HATS.—Henry Kellogg, New Haven, Conn.

I claim a hat formed and constructed by combining animal fibre with vegetable pulped fibre, substantially as herein set forth and described.

62,038.—WATER CRANES FOR SUPPORTING LOCOMOTIVES.—Lewis Y. Ketcham, Port Jervis, N. Y.

I claim, First, the water shaft c, within the pedestal a, constructed, arranged and operated substantially as described.

Second, The arrangement of means or devices for operating the water valve and the outlet valve, as herein shown and described.

62,039.—OILER.—John Kipp and William Allmendinger, Melrose, N. Y.

We claim, First, An oiler consisting of a reservoir C, and air pipe B, a discharging pipe E, with a removable nozzle F, all constructed and operating substantially as herein described for the purpose of oiling below the level of the operator.

Second, In combination with the elements recited in the forgoing claim, an elastic bulb, operating substantially as and for the purpose as herein described.

Third, In combination with the elements recited, in both of the foregoing claims a suitable device for opening and closing the air hole in the air pipe B, substantially as and for the purpose herein described.

Fourth, The curved removable nozzle and the adjustable discharging pipe in combination with the other parts of an oiler, all being constructed substantially as herein shown and described.

62,040.—COTTON BALE TIE.—J. Knight (assignor to T. C. Coleman), Lousville, Ky.

I claim forming a bale tie loop A, with turned edges, a a, and one diagonal and one square end, arranged and applied for securing the ends of a hoop in the manner herein described.

62,041.—RAILWAY SWITCH.—Ezra B. Lake, Bridgeport, N. J.

First, I claim the rails A, and A', of the main track and the rails B, and B', of the turnout and switch rails C, and C', in combination with the operating lever J, and the devices herein described or their equivalents for communicating motion from the said operating lever to the switch rails.

Second, The operating levers G, H, and D, and their connections in combination with the switch rails.

Third, The combination of the above mentioned operating levers with the movable bars x, situated beneath the cars.

Fourth, The combination of the slotted bar D, eccentric P, its arm t, and rods l, and n.

62,042.—FISH HOOK.—Benjamin Lee, Jr., Williamsburgh, N. Y., assignor to himself and Alfred Woodham, New York City.

I claim a spring B, or its equivalent in combination with a fish hook, substantially as and for the purpose described.

62,043.—BEEHIVES.—C. P. Lloyd, Portsmouth, Ohio.

I claim the combination of the boxes C, with sides as described and openings f, slides g, and suspended attachable frames D, constructed and operating substantially as and for the purpose specified.

62,044.—BRONZING MACHINE.—John Knox Lowe, Cleveland, Ohio.

First, I claim the fur or otherwise lined case described, constructed and operating substantially as and for the purposes set forth.

Second, Wiping cylinder D, and cloth E, in combination for the purposes of operating in a bronzing machine substantially as described.

Third, The combination of the fur roller with the lined box, its cylinder the wiping cylinder and its cloth constructed and operating together, substantially as and for the purposes explained.

Fourth, Feed tapes G G, or their equivalents, in combination with tapes F F, to receive, carry and deliver the sheet substantially as described.

62,045.—MUD BOAT.—Almon D. Monley, Washington, Mich.

First, I claim the combination of one or more mud vats C, with two boats or buoys A, placed parallel with each other and connected with timbers B, substantially as herein described and for the purpose set forth.

Second, The combination of the sectional drop battons c' c2, and the lever catch E, with the mud vats C, when the said drop battons are constructed and arranged substantially as herein described and for the purpose set forth.

62,046.—CHURN.—Geo. W. Manson (assignor to Nicholas W. Manson), Buxton, Mass.

I claim as a means of imparting motion to two dashers in a churn, the arrangement of the geared wheel, B, geared wheel, D, crank shaft, E, connecting rod, h, and working beam, F, swinging on the support, G, the working beam, F, being so connected with the two dashers that it can be separated from the dashers when the cover of the churn is to be removed in the manner and for the purposes set forth.

62,047.—CAR SEAT FOR RAILWAY CARS.—Frank Martin, Aurora, Ind.

First, I claim in combination with a revolving seat, E F F', and hinged back, G, the flexible straps, H H', and retaining hooks, I I', or their mechanical equivalents.

Second, In combination with the frame, A B, and revolving seat, E F F', I claim the hooked bar, K k k', and lugs, L L', employed to secure the seat against rotation, substantially as described.

62,048.—MACHINE FOR SHARPENING CALKS OF HORSESHOES.—J. B. McClanathan, Horicon Wis.

I claim the frame, A, having the burr, D, mounted therein, in combination with the rigid pivoted plate, C, and set screw, F, arranged as described.

Second, Providing the upper front face of the plate, C, with the corrugations to act as rests or supports for the point of the calk as described.

62,049.—TENT BEDSTEAD.—A. D. McCoy, New Orleans, La.

I claim the bedstead, A, having adjustable head rest, B, operated by the frame, C, supporting the upright b, with connecting stretcher rods, c d, bearing the inclined rod, d2, which intersect and form crotches, f, on which rests the beam, g, constructed and operating as described for the purpose specified.

62,050.—SEWING MACHINE.—James S. McCurdy New York City.

First, I claim the hoop, F, constructed with an opening d, a point, h, on one side of the said opening, and a hook, e, on its inner circumference and driven by a tongue or projection, a, on the rotating mandrel of the sewing machine, all substantially as herein specified.

Second, In combination with a rotating hoop constructed and operating substantially as hereinbefore specified, a bobbin so held within but out of contact with the said hoop as to be confined in the direction of its axis but to be capable of free rotation, substantially as herein specified.

Third, The holding device by which the bobbin is held within and in proper relation to, but out of contact with the rotating hoop consisting of the two rings, K and L, one of which has an offset, k, for the partial support of the bobbin, substantially as specified.

Fourth, The arrangement of the adjustable feed pam, P, stop collar, R, spring, t, and nut, T, the whole applied to the rotating mandrel, C, or its equivalent, substantially as herein set forth.

62,051.—BEEHIVE.—Charles McGrew, Bloomington, Ill.

I claim the bottom, c, above the openings, b' leaving the space, d, in combination with the case, A, having water trough, C, on its sides which with the front space below the alighting board is painted white, for the purpose described, and operating in the manner as and for the purpose specified.

62,052.—SAUSAGE STUFFER.—Purches Miles (assignor to Theodore Mace), New York City.

I claim the follower, d, and axle, c, in combination with the vertical hopper, a, having a curved bottom, and the nozzle, f, introduced through the vertical side, a', as specified.

I also claim forming the hopper, a, with the curved bottom and sides cast in one piece, to receive the follower, d, axle, c, and front, a', as and for the purposes specified.

62,053.—FIRE PLACE.—Warren P. Miller, San Francisco, Cal.

First, I claim a lining or partition, g, made of a suitable reflecting metal and located within an air heating chamber behind the fireplace or chamber and separating the latter from the dead air chamber, substantially as and for purpose specified.

Second, In combination with the partition, g, I claim the air-heating chamber, e e e, and dead air or non-conducting chamber, d, all constructed and arranged in the manner and for the purpose specified.

62,054.—DEVICE FOR LUBRICATING THE AXLE OF VEHICLES.—Jacob F. Morris (assignor to himself and Calvin Lockrow), Lansingburgh, N. Y.

I claim the combination of the oil cup or reservoir, F, one or more furnished with short tubes, G and J, strainer, H, sponge, I, and cap, K, or equivalent, with the hub, D, and axle box, E, of the wheel, substantially as herein shown and described for the purpose set forth.

62,055.—PROCESS OF PREPARING INDIA-RUBBER.—William Mullee, Franklin, Pa.

First, I claim the above described process or method of treating or preparing india-rubber for use or manufacture.

Second, I claim as a new article of manufacture the substance produced by subjecting india-rubber either pure or when mixed with other substances, to the process herein described.

Third, I claim the racks, R, or their equivalent for holding the sheets of rubber while in the bath, as set forth.

Fourth, The combination of the feed roller, B, and the roller, C, armed with teeth for removing the crystals from the sheets as described.

Fifth, The hollow drum, E, and roller, D, when combined and used for the purpose set forth.

Sixth, The bath with the fireplace, A, and the heat flue or passage, a, arranged as herein shown and described.

62,056.—MACHINE FOR DRESSING STONE.—William M. Murrey, Tiffin, Ohio.

First, I claim supporting the adjustable frame, A, which carries the vibrating pick and the mechanism for operating it, upon a bed frame, A', and adjustable frame, B, in such manner that frame, A, can be adjusted substantially as described.

Second, The combination of the adjusting screw, a, hook, A4, stay, a' and perforated cross bar, A3, with the bed frame, A', substantially in the manner described.

Third, The construction of the device, m m' n, for the purpose and in the manner substantially as described.

Fourth, Pivoting the pick arm, E, to a vertically adjustable block, d2, substantially as and for the purpose described.

Fifth, The means substantially as described for adjusting the fulcrum block, d3, for raising and depressing the rear end of the hammer arm.

Sixth, The application of the shaft of the wheel, G, to a vibrating frame, H substantially as described.

Seventh, The combination of vibrating frame, H, pinion wheel, h, and spur wheel, d and j, arranged and operating substantially as described.

Eighth, Supporting shaft, c, carrying the parts described, at one end by frame, A, and at the other end of a lever, C, substantially as and for the purposes described.

62,057.—ATTACHING BITS TO BRACES.—John H. Nellis, Richmondville, N. Y.

I claim a bit having a groove with the spring, C, constructed as described and operating in the manner substantially as specified.

62,058.—CONSTRUCTION OF PAPIER MACHE MATRICES FOR STEREOTYPE PLATES.—William Nelson, Boston Mass.

I claim a papier mache matrix for casting stereotype plates, composed of flour paste, paris white and plumbago, and molded in the manner substantially as herein set forth.

65,059.—BUCKLE.—Hermann Neumann, New York City.

I claim the combination of the tongue, B, free at one or both ends with side bars, F, of the buckle frame, the whole constructed and operating substantially as described.

62,060.—CULTIVATOR.—W. J. Oxer, Williamsport, Ind.

I claim an improved iron cultivator frame formed by the combination of the bar, A C and F, with each other, when said bars are constructed and arranged substantially as herein shown and described.

62,061.—DOOR AND GATE LATCH.—J. A. Park, Lansing, Mich.

I claim the arrangement of the plate, A, with the latch, C, and shaft with weight, D, with or without the spring when constructed in the manner substantially as herein set forth.

62,062.—PIPE TONGS AND CUTTER.—John Peace, Camden, N. J.

I claim a pair of pipe tongs having an adjustable screw, E, socket, D, with a series of griping edges at each end, substantially as and for the purpose described.

62,063.—MACHINE FOR BENDING SKELP.—John Peace, Camden, N. J.

I claim the horizontal slide rest, A, or its equivalent, the adjustable bracket, C, the bent lever, E, the adjustable stop, D, and the dies, F F, all constructed combined and arranged substantially as and for the purposes herein described.

62,064.—COURRIER'S "SLICKER."—Daniel Peters and John W. Pauly, Keokuk, Iowa.

First, We claim forming the handle, A, in two parts, a', a2, substantially as herein described and for the purpose set forth

Second, Forming the blade, B, with a slot, b4, substantially as herein described and for the purpose set forth.

Third, The combination of the half round friction wires, b' and b2, and the metallic lined grooves, a3 and a4, with the blade, B, and handle, A, substantially as described and for the purpose set forth.

Fourth, The combination of the friction and strengthening bolt, C, with the slotted blade, B, and with the handle, A, substantially as described and for the purpose set forth.

62,065.—OIL CAN.—Abraham H. Phillippi, Reading, Pa.

I claim the box, L, flat spring, X, rod, R, arm, A, and rod, U, when the whole are arranged as and for the purpose set forth and described.

61,066.—GRAIN DRILL.—Hiram Pulse, St. Paul, Ind.

First, I claim the provision in a grain drill of the separator, I, between the place of supply and delivery, substantially as and for the purpose set forth.

Second, The arrangement of notched rod, W, bell crank, X, draft rod, Y, and slotted clevis, Z, or their mechanical equivalents for the optional rectification of the side draft by a person at the rear of the machine, substantially as set forth.

62,067.—CORN PLANTER.—John M. Reeds, Millford Township, Mo.

I claim the steel spring marked, A, on the drawing and roller and double gearing also above described in combination with the hand corn planter as specified.

62,068.—AXLE BOX FOR VEHICLES.—John Reilly, Racine, Wis., assignor to himself and Thomas Falvey.

I claim casting the box around the rings, as and for the purpose described.

I also claim the arrangement, as described, of the rings within boxes, so that the box shall overlap the rings, to prevent the displacement of the rings from end thrust of the axle on the boxes.

I also claim the combination, substantially as described, with an axle box of hollow longitudinal ribs, which serve both to fasten the box in the hub, and to convey oil to the axle, whether said ribs or chambers be cast with the box, or made separately of cast or wrought metal, and afterwards attached to the box.

I also claim the arrangement of the oil reservoirs, the axle and the lining rings, as and for the purpose set forth.

62,069.—COTTON-BALE TIE.—J. Reinecker, New Orleans, La., assignor to Gustavus Ricker, Covington, Ky.

I claim the plate, B, provided with the semicircular opening, a, and the opening, c, with inclined sides, d, presenting two sharp edges or angles to the strap, substantially as described for the purpose specified.

62,070.—PROCESS OF MANUFACTURING ALCOHOLIC SPIRITS.—John W. Richardson (assignor to himself, Daniel L. Davis, and Jeremiah Kimbrough), Ogden, Ohio.

I claim the process of manufacturing alcohol from the juice or skimming of sorgho or other (so called) northern cane, substantially as described.

62,071.—GAGE FOR CIRCULAR SAWING MACHINES.—John D. Riley, Cincinnati, Ohio. Antedated Feb. 2. 1867.

First, I claim the beveling fence, B, hinged to the arms, A A, and adjustable to cut a bevel at any desired angle, substantially in the manner and for the purpose set forth.

Second, And in combination with the above, I claim the guide bar, G, and piece, H, having curved slots, set screws, I I, and hinged arms, F F, constructed with the cross bar, E, substantially in the manner and for the purpose set forth.

Third, I claim the hinged beveling fence, B, provided at its back edge with the hinged slotted cross bar, C, in combination with the hinged uprights, D D, to adjust said fence to any desired angle, substantially in the manner and for the purpose set forth.

62,072.—SMITH'S FORGE.—William H. Risher, Austin, Texas.

First, I claim the construction of the tweer with a central chamber, k, into which the ashes, cinders, and other matters collect, said chambers having a passage between its upper end and the fire bed of the tweer, so that the air

of the bellows or blast nozzle shall circulate in a chamber outside of the chamber, k, and pass up to the grate through the space which is between the fire bed plate and the upper edge of the chamber, k, all substantially as and for the purpose set forth.

Second, The construction of the tweer, substantially in the manner and for the purpose described.

62,078.—BELT LAP CUTTER.—Charles E. Robinson, Concord, N. H.

I claim attaching the knife to a grooved sliding block, E, working in grooves in the top leaf or upper part, B, of the machine, and provided with a handle, G, substantially in the manner and for the purpose herein shown and described.

Second, The combination of a rubber or other elastic seat with the lower leaf or part, A, of the machine, substantially as herein shown and described.

Third, Hinging the lower and upper parts or leaves, A and B, to each other at one end, substantially as herein shown and described.

62,074.—ENAMEL FOR COVERING HOOP-SKIRT SPRINGS.—W. S. Ryerson, Philadelphia, Pa.

I claim enameling the covering of hoops or springs of a hoop skirt or of so many of them as may be necessary, with a composition prepared of the ingredients, and in the manner and proportions herein described and set forth.

62,075.—ICE PLANER OR CUTTER.—James Serrill, Philadelphia, Pa.

I claim an ice cutter or planer, consisting of the adjustable cutting knife, A, supporting block, B, guides, C C, incorrodible surface plates, D D, and the tunnel or spout, E, arranged and combined together as described, as an improved article of manufacture, for the purpose specified.

62,076.—HORSE SHOE.—George Sewell, Poughkeepsie, N. Y.

First, I claim the construction of a horse shoe with a supplementary detachable portion, B, substantially as herein set forth for the purpose specified.

Second, The attachment of the supplementary portion, B, to the part, A, of the shoe, by means of the tapering dovetails, f, tapering dovetail socket, c, spurs, h, and keys, l, arranged in relation with each other substantially as herein set forth.

62,077.—BREECH-LOADING FIRE-ARM.—Christian Sharps, Philadelphia, Pa.

First, I claim the combination of the hooked projection, w, or its equivalent, or the lever, D, with the lip, y, or its equivalent, on the sliding breech, for the purpose specified.

Second, The spring bar, H, arranged to slide in the frame, B, and having a notched projection, j, in combination with the levers, D, and its arm, F, the whole being arranged substantially as described, so that the cartridge may be extracted either by the manipulation of the lever, D, or sliding rod, E.

Third, The combination of the spring plate, G, on the lever, D, the notch, e, on the arm, F, and portion, h, of the frame, by which the said spring plate is released from the notch on moving forward the said lever, D.

62,078.—WINDOW FASTENER.—J. D. Simmons, Quincy, Ill.

I claim the eccentric lever, B, provided with the notch, X, and the lug or wing, Z, for the purpose of stopping the spring and preventing strain upon the same, in combination with the plate, A, formed as described, and the spring, D, provided with bar, b, the whole arranged and used as and for the purpose specified.

62,079.—WHEAT DRILL.—Jacob Slauder (assignor to himself and Levi C. Smith), Osborn, Ohio.

I claim the shaft, d, with the worms or screws, e, over the openings, i, in the bottom of the hopper, C, in combination with the gear wheels, b c, and one of the driving wheels, E, constructed, arranged, and operating substantially as and for the purposes herein described.

62,080.—SEEDING MACHINE.—F. F. Smith and A. Thurston, Four Corners, Ohio.

We claim, First, So combining the lever, E, with the seeding stocks, G, and clutches, e f, that the movements of the said levers will elevate the seeding stocks simultaneously with the operation of the clutches to stop the motion of the seed-dropping mechanism, substantially as herein set forth.

Second, The retention of the plate, c^2, in its place, with reference to the cylinder, J, and hopper, I, by means of the groove, c'', and removable upper part, a^2, of the aforesaid hopper, substantially as herein set forth and for the purpose specified.

62,081.—SHAFT COUPLING.—Henry K. Smith (assignor to himself and Charles Osgood), Norwich, Conn.

I claim the shaft coupling herein described, the same consisting of the sleeve, C, having beveled or inclined ways or grooves, D, pieces or blocks, E, and screw bolts, H, when combined and arranged together, substantially as and for the purpose specified.

62,082.—SINK.—Sidney Smith, Greenfield, Ohio.

I claim, First, The arrangement, in a metallic kitchen sink, of a grating, C, substantially as described and for the purpose set forth.

Second, The arrangement in a metallic kitchen sink of the movable baskets, substantially in the manner described.

62,083.—STEAM GAGE.—William Stamp, Susquehanna Depot, Pa.

First, I claim a concave flat-bottomed or saucer-shaped steel plate diaphragm fitted in a steam gage, and constructed substantially as herein described.

Second, I claim also the eccentric adjusting pin, i, or its equivalent, in combination with the pendent lever, h, and the segment, d, constructed and operated substantially as herein described.

62,084.—WASH BOILER.—M. W. Staples, Catskill, N. Y.

I claim the chambers, B and C, the perforated partition, E, and the circulation tubes, D, with apertures, a, arranged substantially as shown and described, in combination with a boiler for the purposes herein set forth.

62,085.—BASKET MACHINE.—Geo. Storer, New Britain, Conn.

I claim, First, The gudgeon, c, extending from the stock, m, and turning upon the pin, i, in combination with the mold block, d, as specified, so that said gudgeon, c, will be sustained by its stock in a horizontal or vertical position, for the purposes set forth.

Second, I claim the mold block fitted so as to be revolved in combination with the clamping cap, e, and movable center, f, substantially as and for the purposes specified.

62,086.—MACHINERY FOR MAKING OVAL PICTURE FRAMES.—John E. Sweet (assignor to John S. Bon and E. R. Sanford), Syracuse, N. Y.

I claim, First, The combination and arrangement of the shafts, C D E, and their pinions, with their crank and its boxes, substantially as described and for the purposes set forth.

Second, The eccentric sleeve, S, for varying the throw of the crank, substantially as described.

Third, The combination of the scraper, R, arm, O, upright, L, with or without the pedal, P, as described and for the purposes set forth.

62,087.—PICKER CUSHION FOR LOOMS.—Wm. J. Thorn (assignor to himself and F. A. Betts), Westbrook, Me.

I claim a tanned leather picker cushion for weaving looms manufactured and prepared in the manner herein set forth.

62,088.—SMUT MACHINE.—Wm. E. Tickler, Ezra T. Marshall and Daniel M. Marshall, Pierceton, Ind.

We claim, First, The smut machine consisting of the cylinder, B, hollow shaft, C, brushes, E, shaft, D, cones, d, standards, e, riddle, G, fan, T, and pipe, p, operating substantially as described, for the purpose specified.

Second, The spreading device consisting of the pivoted valve, n, elastic fingers, o, arranged in the spout, m, substantially as and for the purpose specified.

62,089.—BRICK BURNER.—Wm. H. Towers, Boston, Mass.

I claim the revolution of unburned bricks within a circular turret or kiln in such a manner that during the first part of a revolution they shall dry and become gradually heated, then be thoroughly baked during their passage over a furnace, and then gradually cool until, at the completion of the revolution, they shall be delivered perfectly burned and serviceable bricks, using for the purpose the apparatus hereinbefore described, or any other substantially the same and which will produce the desired effect.

62,090.—MACHINE FOR PULLING FLAX.—Samuel W. Tyler (assignor to Thos. M. Cleeman, George P. Prescott, Wm. Deyermand, E. H. Jones and Henry Holmes), Troy, N. Y.

First, I claim for pulling flax and such other crops as require such similar harvesting, the use of a series of two or more belts or bands, made flexible so as to ply around pulleys or cylinders and properly arranged to work in conjunction by pairs, so as to eradicate or pull the crop from the earth, and this I claim irrespectively of any pulling or eradicating movement that may be given to the belts, or of any particular form or kind of material employed in the construction of the same, substantially as set forth.

Second, I claim constructing the belts with irregular or corrugated surfaces upon their outer or grasping sides, for the purposes set forth, and substantially as described.

Third, I claim constructing pullers with webbing or other comparatively non-elastic foundation cushioned with india-rubber or other soft material, substantially as described.

Fourth, I claim arranging the belts upon the machine in the position of an inclined plane, in such a manner that their grasping sides shall traverse upward and backward at the same time, for the purposes set forth and substantially as described.

Fifth, I claim so imparting motion to the pullers that each section of each pair thereof shall move in a direction around its axis or axes opposite to that of its fellow, so that the conjunctive sides of the two shall move together in one direcuon, in combination with impinging elastic surfaces, substantially as described.

Sixth, I claim so arranging the belts as to leave an open space between their grasping sides at the point X', substantially as set forth and described.

Seventh, I claim giving to the belts, Z and Z', when used in pairs, a motion so corresponding to that of the driving wheel that their grasping sides shall traverse backward at the same rate of speed as that at which the machine is advanced, for the purposes set forth and substantially as described.

Eighth, I claim the intermediate pullies, u, or their equivalent, for the purposes as set forth.

Ninth, I claim the revolving fingers, t, or their equivalents, in combination with the traveling elastic pullers, for the purposes set forth.

Tenth, I claim the brace boards, Y, or their equivalent, for the purposes set forth and substantially as described.

Eleventh, I claim so constructing that portion of the frame upon which the pullers are situated as to form an open space through which the crop may pass unimpeded to the platform, substantially as described.

Twelth, I claim attaching the intermediate pulleys, u, in such a manner that they may be so adjusted as to produce any desired degree of pressure upon the crop between the belts, substantially as described.

Thirteenth, I claim an automatic raking or delivering device when arranged in a manner to support the crop in an upright position while it is being conveyed along from the pullers or cutters to the point at which it is delivered from the rake, substantially as described.

Fourteenth, I claim in combination with the pullers a vibrating separator for separating the swath from the standing portion of the crop, substantially as described.

Fifteenth, I claim the separating swords or blades, X, for the purposes set forth and substantially as described.

Sixteenth, I claim so attaching the pullers to the machine, in connection with springs, as to secure to them an automatic or self-adjusting pressure upon the crop, substantially as described.

Seventeenth, I claim the adjustability of the tongue, E, in combination with the traveling elastic pullers, substantially as described.

Eighteenth, I claim so constructing and attaching the deflecting guards, N, as to allow the crop to approach the pullers at a point upon the opposite side of the line of their axes, for the purposes set forth and substantially as described.

62,091.—NUTRITIVE MEDICINE.—Samuel C. Upham, Philadelphia, Pa.

I claim a nutritive medicine composed of the within-described ingredients, prepared in the manner and in the proportions substantially as set forth.

62,092.—LUBRICATING OIL.—P. H. Vander Weyde, Philadelphia, Pa.

I claim the manufacture of illuminating or burning oil and a superior lubricating oil from common petroleum, combining the filtering, evaporating at a low temperature, and thickening processes above described.

62,093.—PREVENTING INCRUSTATION IN STEAM BOILERS.—P. H. Vander Weyde, Philadelphia, Pa.

I claim the attachment within the upper part of the steam room of a boiler of a number of short rods resembling small inverted straight or curved lightning rods, or their equivalents, intended to carry the positive electricity of the steam to the bottom of the boiler where it discharging in the water repels the electro positive deposits preventing them from settling and thus protects the boiler from incrustation.

62,094.—MAKING AND USING NITROUS OXIDE GAS.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, The new economical method of making nitrous oxide gas, as above described.

Second, The apparatus for compressing and liquefying it, as above described.

Third, The use of the liquefied gas after its re-expansion as an anæsthetic for surgical operations (and anti-spasmodic) in cases of typhoid fever, cholera, and other medical operations.

Fourth, Its use as a substitute for oxygen for the Drummond or Calcium light, or hydro-oxygen blow pipe for magic lanterns, light houses, melting of platinum, etc.

Fifth, Its use as a bleaching, oxydizing, deodorizing, and disinfecting agent.

Sixth, The use of the liquefied gas as a store of motive power, for driving railroad cars and other contrivances.

62,095.—GAS GENERATOR.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, A gas generator when the acid is entirely separated from the substance from which the gas is evolved brought in contact only in proportion to the pressure and quantity required and adapted to the instantaneous generation without the application of heat of the following gases: hydrogen, oxygen, carbonic acid, hydro-sulphuric acid, sulphide of ammonia, nitric and nitrous oxide, and hypo-nitric acid.

Second, The long-necked bell jar, A, contracted and expanded below as described above preventing the absorption of the gas by the liquid.

62,096.—TUBULAR STILLS FOR CONTINUOUS DISTILLATION.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, A still consisting of a series of tubes situated in the flue, through which tubes the liquid to be distilled is uninterruptedly passed in a small stream and in its downward course submitted to a continually increased heat.

Second, I claim a number of vapor tubes attached at different hights to this tubular still giving exit to vapors of different density and volatility, each exit tube condensing its own vapor separately in a common worm Liebig's condenser, or any other kind, and thus producing liquids of different density by one single uninterrupted operation; also preventing fusil and other oils from contaminating any other part of the apparatus or of its products with their flavors.

Third, The manner of connecting the tubes by means of traps for the separation of the different vapors, and by screw caps giving access to their interior for cleaning, repair, or other purposes.

62,097.—MANUFACTURE OF WHITE LEAD.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, To effect with the same apparatus and one single operation the separation of the products of the distillation of wood, chiefly of the acetic acid the immediate transformation of the remaining charcoal into carbonic acid and the use of those two products to the manufacturing of white lead, in the manner described.

Second, The spiral inverted gutter, h h, intended either to secure a more perfect absorption of the carbonic acid or any other gas by the liquid or to charge air or gas more perfectly with the vapor of the liquid through which it passes.

Third, The treatment of the precipitate with a hot alkaline solution of quicklime, or its equivalent, and the washing out of the filters with lime water.

62,098.—ELEVATOR.—R. M. Van Sickler, New York City.

I claim, First, A portable elevator consisting of a car or truck mounted on two sets of wheels substantially as described with grooved tracks or guide posts mounted thereon and a carriage or platform supported by and moving in connection with said posts, substantially as herein shown and described.

Second, I claim having the tracks or guide posts made adjustable, substantially as and for the purpose herein shown and described.

62,099.—SODA-WATER STAND.—A. Van Winkle, Newark, N. J.

I claim, First, The arrangement of two or more tiers of sirup cans one above the other in a soda-water stand, substantially as and for the purpose described.

Second, Making the cans of the upper tier narrower than those of the next succeeding one below, substantially as and for the purpose set forth.

62,100.—COOKING STOVE.—George W. Walker, Boston, Mass.

I claim the arrangement of the flue, l, with respect to the oven and the main flue, substantially as described.

62,101.—BREWERS' MASH TUN.—James Walker, Cincinnati, Ohio.

First, I claim the provision in a mash tun of the radiating inlets to the drain pipe or pipes, substantially as and for the purposes set forth.

Second, The elevated drain pipe proper within the mash tun, substantially as set forth.

62,102.—LATCH FOR GATES.—W. T. Wells, Decatur, Ill.

I claim the combination with a latch of a slotted plate, or its equivalent, when the two are so constructed and arranged together as to operate substantially in the manner described and for the purpose specified.

62,103.—Suspended.—

62,104.—ELASTIC MARKING ROLLER.—L. B. Witherell, Galesburgh, Ill.

I claim the supplementary ball and handle, G h, in combination with the ball and handle, D F, of an elastic printing cylinder, substantially as and for the purpose specified.

62,105.—MAKING HAMMERS.—J. Yerkes, Fox Chase, Pa.

I claim constructing claw hammers of cast iron, in the manner described.

62,106.—COVERING HARNESS TRIMMINGS WITH VULCANIZED RUBBER.—Andrew Albright, Dryden, N. Y.

I claim providing metallic trimmings for carriages and harnesses with a coating of vulcanized caoutchouc or hard rubber, substantially as and for the purpose herein set forth.

RE-ISSUES.

2,474.—SHEARS.—Barnard, Son & Co., Waterbury, Conn., assignor to Wm. B. Barnard. Patented Dec. 27, 1864. Reissued March 27, 1866.

We claim uniting the blades and handles of shears, lamp trimmers and similar instruments by means of one or more rivets homogeneous with said handles, in combination with a rebate or recess of any suitable form, made in the end of the handle to receive the inner end or tang of the blade when the shoulder or inner edge of the recess does not project above the face of said tang after it has been properly secured therein, all substantially in the manner and for the purpose herein set forth.

2,475.—POCKET BOOK.—J. Frederick Dubber, Brooklyn, N. Y. Patented Jan. 10, 1865.

I claim a pocket book or other similar article provided with one or more strips, d, of steel or other elastic material, in the edge or edges of its closing flap, e, substantially as and for the purpose described.

2,476.—HEATING STOVE.—Samuel B. Sexton, Baltimore, Md. Patented April 19, 1859. Reissued Dec. 3, 1861. Again reissued Feb. 6, 1864. Again reissued Sept. 27, 1864.

First, I claim a stove for warming or heating purposes constructed with a fuel magazine supported free from the grate, and a combustion chamber having a grated fire and air supplying bed of a greater diameter than the fuel magazine, so arranged and constructed that the fuel can spread out laterally and form a conical pile and burn in thin layers out to the wall of the stove, so that the inflamed gases may burn in a free space as they are evolved from the entire outer surface of the incandescent conical pile of coals and so that air shall be supplied in a direct manner through the grate into said free space, substantially as and for the purposes described.

Second, In combination with the subject matter of the first claim, constructing the combustion chamber, A, with projecting window frames or door frames, substantially as and for the purposes described.

Third, A stove for warming or heating purposes embracing the features of construction mentioned in my first claim and the additional feature of the gas or products of combustion, circulating apartment above and around the upper portion of the magazine, substantially as and for the purposes described.

Fourth, A stove for warming and heating purposes wherein the spreading of the coals in a lateral direction from the lower end of the magazine is wholly unobstructed all around and out to the wall of the stove, A, and at the same time the combustion chamber proper is formed by the outer wall of the stove, and the products of combustion circulate underneath and around the magazine, in combination with illuminating door or windows in the said outer wall, said windows or doors being located above the grate and above the upper margin of the lining of the wall, substantially as and for the purposes described.

Fifth, The combination of a fuel supply magazine, H, which has its lower end free from the grated fire bed, G, and an unobstructed space below it where the fuel may spread out laterally and burn in a conical pile and in thin layers to the outer wall of the stove, with a stove, A, which has illumination doors or windows in its wall above the lining, all in such manner that the fire can be kindled through the apertures which are covered by the doors or windows, substantially as set forth.

Sixth, The combination of the unobstructed free space, F, out to the wall of the stove above the lining, the illumination windows or doors in wall, A, and gas circulating space, p, around the circumference of the magazine, substantially as described.

Seventh, In a coal supply magazine stove, I claim the extended grated surface of the fire bed outside of reservoir or magazine, in combination with the free space around the magazine of a base burning stove, substantially as described.

Eighth, Increasing the combustion and the consequent heating effect of the coal and also insuring a more brilliant illumination of the wall of the stove, by constructing, arranging and combining the combustion chamber proper, the magazine and the grated fire bed, all substantially in the manner herein specified.

2,477.—PEN AND PENCIL CASE.—Wm. S. Hicks, New York City. Patented Sept. 12, 1865.

First, I claim the case, A, consisting of a simple tube, provided with the cap, c, and short inner tube, e, arranged as set forth.

Second, In combination with a case consisting of a single tube, I claim the reversible handle, substantially as set forth.

2,478.—BOAT DETACHING TACKLE.—Thomas Huntington, New Rochelle, N. Y. Patented June 5, 1866.

First, I claim the employment or use of a single shaft, C, arranged with hooks, B, in the manner shown, or in an equivalent way so that by the turning of said shaft the hooks, B, may be simultaneously liberated to detach the boat from the davits.

Second, The hooks, B, suspended or fitted in the plates, A, in combination with the arms, e, attached to the shaft, c, all being applied to the boat and arranged to operate substantially in the manner as and for the purpose set forth.

2,479.—CUPOLA FURNACE.—John and Thomas Insull, New Haven, Conn. Patented May 8, 1866.

First, We claim the annular air chamber, C, in combination with one or more blast pipes, D E, and with the furnace, A, constructed and operating substantially as and for the purpose described.

Second, The partition, b, in combination with the annular air chamber, C, blast pipes, D E, and furnace, A, constructed and operating substantially as and for the purpose set forth.

Third, Making the tweers oblong instead of round, as usual, for the purpose described.

Fourth, Two or more rows of tweers placed in a zigzag position, substantially as and for the purpose set forth.

Fifth, The apertures, a', in the outer wall of the air chambers, C, in combination with the tweers, a, constructed and operating substantially as and for the purpose described.

2,480.—MANY-BARRELED FIRE-ARMS.—Christian Sharps, Philadelphia, Pa. Patented Jan. 25, 1859. Division A. Reissued June 18, 1861.

I claim the combination of a discharge with the hammer and the devices herein described, or the equivalents to the same, for changing the position of the discharger on the movement of the hammer.

2,481.—BREECH-LOADING FIRE-ARMS.—Christian Sharps, Philadelphia, Pa. Patented Jan. 25, 1859. Division B. Reissued June 18, 1861.

First, I claim the lever, M, with its projection, V, and the rod, N, in combination with the barrel and its stock, when the whole is arranged as set forth, and when the lever, M, is so formed as to serve the purpose of a trigger guard.

Second, Causing the spent cartriges to be withdrawn from the barrel during the movement out of the same by means of a clip or clips applied and operating substantially as set forth.

2,482.—EAR, CHEEK, AND CHIN MUFFS.—Wm P. Ware, Cincinnati, Ohio. Patented July 6, 1858.

First, I claim a muff or pocket for the ear formed so as to surround the base of the ear and extends of a size and shape to contain the ear and protect the same from cold, substantially as set forth.

Second, I claim a cheek and chin muff suspended from the ears, substantially as specified, instead of being fastened around the neck or over the head.

Third, I claim muffs or pockets formed to set over the ears and held in place by a connection passing down under the chin, substantially as shown.

2,483.—HARVESTER.—Robert T. Campbell, Washington, D. C., assignee of Thos. J. Stealey. Patented Dec. 15, 1857. Reissued Nov. 6, 1866.

First, I claim combining with a hinged platform which is free to conform to the undulations of the ground independently of the motions of the draught frame, or of the axle of the transporting wheels, a toothed rake which will deliver the cut grain upon the ground in gavels, and a reel or gathering device, which will press the standing grain toward the cutters, said rake and reel or gatherer being wholly supported upon said platform, substantially as described.

Second, Combining with a hinged platform a toothed rake and a reel or gatherer, which are wholly supported upon and move in harmony with said platform, an adjustable hinged connection which will allow of the vertical adjustment of the cutting apparatus to adapt the machine to different hights of cut required, substantially as described.

Third, Sustaining a toothed rake and a reel or gatherer wholly upon a platform which is supported at its inner end by a vertically adjustable joint, and at its outer end by a wheel or its equivalent, substantially as described.

Fourth, Suspending the rear inner end of a hinged platform which has a toothed rake mounted wholly upon it, in such manner that this part of the platform can be adjusted vertically without changing the position of the forward adjustable hinge connection, substantially as described.

Fifth, The combination of a hinged finger beam, a platform and an auxiliary adjustable suspending and sustaining jointed or flexible connection, in such manner that the finger beam and platform are suspended at their inner ends and are so supported upon a wheel or its equivalent at their outer ends as to conform at their outer ends to the undulations of the ground, independently of the main frame or of the axles of the supporting wheels, substantially as described.

Sixth, In combination with a vertically adjustable hinge joint and hinged finger beam and cutter bar, and with the crank, d, for communicating motion to the cutters, and the universal joint, m, to connect the pitman, l, with the cutter bar, substantially as described, I claim the adjustable blocks, i and 3, for tightening the joint around the crank wrist, substantially as set forth.

Seventh, The combination of crank shaft, Q, with adjustable bearing, a a, the pitman, Q, and the oscillating rake, S, substantially as described.

Eighth, Hanging the reel to the rake frame or platform and adjusting said reel to different hights by means of braces, w w, or their equivalents, substantially as described.

DESIGNS

2,572.—ORNAMENT FOR HATS AND DRESSES.—Mary A. Lawrence, New York City.

2,573.—TOBACCO PIPE.—Louis Saarback, Philadelphia, Pa.

2,574.—COOK'S STOVE.—Garretson Smith and Henry Brown (assignor to Leibrandt & McDowell), Philadelphia, Pa.

2,575.—FOOR OILCLOTH.—Hugh Christie, Morrisania, N. Y.

2,576.—EDGES OF BOOKS.—John H. Crowell, Providence, R. I.

2,577, 2,578.—PRINTERS' TYPE.—Julius Herriet (assignor to David Wolf Bruce), New York City. Two Patents.

2,579, 2,580, 2,581.—FLOOR OILCLOTH.—Charles T. Meyer, Bergen, N. J., assignor to Edward C. Sampson, New York City. Three Patents.

2,582.—COFFEE STRAINER.—Anthony Shafer and Alexander Barckley, Philadelphia, Pa.

EXTENSION NOTICES.

William H. Johnson, of Springfield, Mass., having petitioned for the extension of a patent granted to him the 7th day of March, 1854, and patented in England the 21st day of April 1853, for an improvement in sewing machines, for seven years from the expiration of said patent, which takes place on the 21st day of April, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 15th day of April next.

Lauren Ward, administrator of the estate of Richard Ward, deceased, of Nangatuck, Conn, having petitioned for the extension of a patent granted to the said Lauren Ward as said administrator on the 28th day of June, 1853, for an improvement in machines for turning irregular forms, for seven years from the expiration of said patent, which takes place on the 26th day of June, 1867 it is ordered that the said petition be heard at the Patent Office on Monday the 10th day of June next.

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WHITE'S CYLINDER OIL CUP.

The two accompanying engravings exhibit a new oil cup for the cylinders of engines, whether stationary, marine, locomotive, or portable, which was patented by Nelson J. White, Aug. 21, 1866. From an examination of one of them we are of the opinion it is well adapted to the work for which it is intended, and that the advantages claimed for it are not exaggerated. These are, in the words of the manufacturer: first, simplicity; there being no cocks to be opened or shut: second, durability; nothing to get out of order by use: third, efficiency; by which the cylinder can be oiled under any and all pressures: and, fourth, economy; as the oil or other lubricator may be compelled to trickle slowly into the cylinder, and not, as in some others, be injected with a rush, to be as quickly ejected with the exhaust steam.

Its operation may be easily comprehended. Fig. 1 is a perspective view of the cup, and Fig. 2 a vertical section showing the parts. A is a cup into which the oil is poured or the tallow placed. It is furnished with a downward opening spring valve, B, operated by the thumb. The oil passes from the cup down into the interior hollow globe, C, which is seated at D, forming another valve. When this globe is secured to its seat by the serrated hand-wheel, A, there is no passage between the steam chest or cylinder to the cup. By turning slightly to the left the hand-wheel forming the cup, the inner globe is raised from its seat, and the steam, passing into the annular space between the two globes, and through the two apertures, E, at the top of the inner globe, equalizes the pressure, allowing the oil to descend by its own gravity through the two apertures at the bottom. Only one packing is required for this cup, that at the top under the receiver, and as there are only two valve seats, which have but a slight upward and downward motion, it seems hardly possible to get the device out of order with proper usage. The power of governing the admission of the oil to the cylinder is an advantage which will be recognized by engineers. This cup is already introduced into the navy, on locomotives, and on stationary engines, with the most satisfactory results. It is manufactured by S. C. Woodward, Lawrence, Mass., who should be addressed for any further information.

Fig. 1

Fig. 2

Turning Tapers.

A correspondent from Connecticut writes:—In a former number of the Scientific American I noticed in answer to a correspondent, a statement that a lathe set on a taper will turn a true cone with a tool above the center. Mistakes are seldom found in your valuable paper, but this I think is one; for in this case the tool does not move in a plane with the axis of the article to be turned, and in passing from the small to the larger end, the tool relatively approaches nearer the plane of this axis in consequence of its being further from its center of rotation.

By experiment the above theory is found to be correct.

It may be such a statement has been made in this paper, although we do not recollect it. But it is erroneous. If the cone is 3 inches diameter at one end and only 1 inch at the other and the tool is ¼ inch above the axis of rotation there will be a departure from the desired taper, because while the difference between the diameter and the altitude of the tool at one end is as 1 to 12, at the other it will be as 1 to 4.

Sounding and Sensitive Flames.

Prof. Tyndall has recently unfolded in a lecture at the Royal Institution, the result of his investigations of the effect of sounds upon flames. Every one has observed the musical sounds emitted by flames, and many will remember observing a curious susceptibility of flames to shocks of sound. The jumping of a naked fish-tail flame in response to musical sounds was first noticed by Professor Lecomte at a musical party in America. Prof. Tyndall exhibited a most wonderful set of experiments on flames or gas jets thrown through glass tubes. These tubes were of all varieties of length and size, and by singing to them, reciting lines of poetry to them, and sounding tuning-forks at them, the lecturer exhibited from each flame a distinct note or song, and the room was at times filled with harmonies as of many Æolian harps. One flame was so sensitive that although 20 inches long, the slightest tap on a distant anvil knocked it down to 8 inches, and the dropping of a sixpence threw it into a violent commotion. Another flame could not tolerate the uterance of a letter S, and a hiss from some one, which the Professor invited, made it flare and shiver in the most odd and ludicrous way. Another danced in response to measured sounds.

Illustrations for Patent Reports.

We are happy to state that the contract for engraving the illustrations accompanying the report of the Commissioner of Patents has been awarded, by the joint committee of the two Houses of Congress, to E. R. Jewett & Co., of Buffalo, to be executed in their new style of relief line engraving. The award was made on the ground of the superior character of their work over all competing specimens offered. The number of patents to be engraved is something over 8,000, larger than during any previous year. The Patent Office is the only self-sustaining branch of the Government. The fund now on hand, after paying the entire expense of the Office, is $280,000, all paid by inventors.

It was the determination of the Committee that the standard of the engravings should not be lowered. The illustrations furnished by Messrs. Jewett & Co., have been of a very excellent quality.

Weldless Steel Tires are now considered the most profitable article of manufacture in the Bessemer steel trade. They pay a royalty of £3 sterling per tun to Mr. Bessemer, and sell at £28 or not quite $125 per tun. The modes of manufacture are constantly improving, and a reduction of price is considered inevitable. A method formerly employed by Krupp, was to cut a slit or mortice lengthwise through a square bloom of cast steel, and then widen it out into a circular shape under the hammer. At the Bessemer Steel Works in Sheffield, an ingot of steel is shaped into a cylinder, from which rings are cut off and afterwards widened and finished. At Crewe, a solid steel cone of cast steel is formed and punched. The process of steel-casting introduced from Prussia by Naylor, Vickers & Co., enables them to produce tire rings direct from the crucible. The cost of cast steel tires, however, is necessarily so much greater than that of Bessemer steel, that their disappearance from the market is considered inevitable.

Foreign Patents.

American Inventors should bear in mind that, as a general rule, an invention which is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. In England the law does not protect the right of a foreign inventor as against the first introducer of an invention from abroad. For twenty years past the great majority of patents taken out by Americans in foreign countries have been obtained through Munn & Co's agency. Patents are secured with the utmost dispatch in Great Britain, France, Prussia, Belgium, Russia, Austria, Italy, The Netherlands, Spain, Sweden, Australia, and other foreign countries. Models are not required, but the utmost care and experience are necessary in the preparation of applications. Patentees who intend to take out Foreign Patents should send to us for a Pamphlet of full advice. Address

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In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions,—smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, $16. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is $35, for the simplest cases, up to $55, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, $20 more is paid the Government, making a total of $61 for the simplest case.

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